G. Hydrology and Water Quality

Introduction

This section discusses existing surface water and groundwater conditions at the project site, and the potential for the project to adversely affect surface or groundwater quality, alter drainage patterns, or increase stormwater runoff rates.

Setting

Climate

The climate at LBNL is temperate, influenced by the moderating effects of nearby San Francisco Bay and the Pacific Ocean to the west, and to the east by the East Bay hills paralleling the eastern bay shoreline. These physical barriers contribute significantly to the relatively warm, wet winters and cool, dry summers of the site. LBNL receives approximately 30 inches of precipitation annually, the majority of which (90 percent) occurs between November through April. Precipitation intensities are seldom greater than one-half inch per hour. Thunderstorms and hail are infrequent, and snow is extremely rare at the site. At the LBNL boundary, maximum discharge rate of Strawberry Creek during a 25-year storm was calculated to be about 1,800 cubic feet per second (cfs); downstream at the lower end of the University of California Berkeley campus, it has been calculated to be about 2,800 cfs (LBNL, 2002).

Regional Drainage

The approximately 200-acre Berkeley Lab facility lies within the upper portion of the Strawberry Creek watershed; this upper portion consists of approximately 874 acres of land east of the UC Berkeley campus. The entire Strawberry Creek watershed occupies approximately 1,163 acres and includes other UC properties, public streets of both Oakland and Berkeley, and private property (LBNL, 2005).

Approximately 35 percent of the LBNL site is covered with impervious surfaces such as buildings, roads, and paved surfaces. Compared to natural ground cover (pervious surfaces), impervious surfaces restrict natural infiltration of surface water and increase stormwater runoff rates and volumes. The remaining 65 percent surface area at the site is pervious surface area consisting of steep hillsides covered with natural grasses and other vegetation to minimize erosion (LBNL 2002).

There is significant surface runoff from LBNL due to its hillside location and moderate annual rainfall. Surface water runoff from the LBNL facility flows into a site-wide storm drain system designed and installed beginning in the 1960s. This storm drain system discharges into the North Fork of Strawberry Creek on the north side of LBNL and into Strawberry Creek on the south side (LBNL, 2002).

The North Fork of Strawberry Creek watershed, which includes Blackberry Canyon, is 141 acres and is comprised of steep canyons and hillsides covered largely with brush, trees, and grass, in addition to LBNL and nearby residential development. Drainage from the North Fork of Strawberry Creek watershed within LBNL and from upper portions of the watershed above LBNL discharges to a 60-inch concrete culvert at the head of LeConte Avenue in Berkeley (LBNL, 2002).

Southerly and easterly portions of the LBNL site discharge to Strawberry Creek through Chicken Creek, a perennial stream, and a number of ephemeral tributaries that are not formally named but that have colloquial designations used for purposes of identification in this document, including "Ten-Inch Creek," "Ravine Creek," and "Cafeteria Creek." Strawberry Creek flows westerly through a detention basin south of the Lab site, and is diverted through 36-inch and 48-inch diameter concrete pipes and emerges as a surface stream near the eastern end of the UC campus. The north and south forks of Strawberry Creek traverse the UC campus and join at the western side of the campus near Oxford Street. These waters are then directed into the City of Berkeley's Oxford and Center Streets culvert. Runoff from the entire watershed, including the lower UC campus, is delivered to the entrance of this culvert, which terminates at the San Francisco Bay, as detailed below.

Building 51 Drainage

Building 51 is located within Blackberry Canyon. Situated at an elevation of about 720 feet above mean sea level, the building complex is constructed on a series of graded level areas adjacent to vegetated natural or manmade slopes, some of which reach a steepness of up to 100 percent. A portion of the building has a second story that opens to another level, graded area. The two levels are connected by internal staircases or a sloping roadway. Building 51 is located on the largest graded area of the LBNL site.

The original tributaries feeding the North Fork of Strawberry Creek, including the Blackberry Canyon drainage, have been altered by historical surface grading and fill placement, which occurred during the construction of earlier LBNL facilities. A parking lot adjacent to Building 51 was constructed on a graded cut and fill over the former natural course of the Blackberry Canyon drainage. The footprint of Building 51 may cover a secondary tributary to Blackberry Canyon. Since the alteration of the original drainages precludes the natural surface water flow through these tributaries, surface water drainage is collected by storm drains and foundation drainage and conveyed through a series of buried, reinforced concrete pipes, which follow the course of the original drainage (LBNL, 2005). Surface water flows from the project site and the larger Strawberry Creek watershed are ultimately discharged into San Francisco Bay south of the Berkeley Marina at the terminus of the municipal storm drain system that conveys Strawberry Creek through the city of Berkeley (LBNL, 2005).

The LBNL storm drain system has the capacity to handle storms with runoff intensities expected in a 25-year maximum-intensity storm (LBNL, 2002). The project site does not lie within the 100-year flood plain as determined by the Federal Emergency Management Agency (FEMA) flood hazard mapping (FEMA-ESRI, 2005). There are no impounded water bodies upstream from

the project site, and therefore flooding associated with failure of a dam would not affect the project.

Groundwater

LBNL Groundwater Conditions

The LBNL site is situated over bedrock, which is covered by a shallow soil surface. The flow and occurrence of groundwater at the LBNL site is controlled by the underlying complex geology, the presence of faults, and fractures in the bedrock (LBNL, 2002). Groundwater flows through the fractures in the bedrock and is therefore slow to recharge. Typically, wells in this type of setting have low yield, while in alluvium or fills, groundwater flows more readily and fluctuates with seasonal precipitation. Groundwater flow generally follows the surface topography either west or south toward the City of Berkeley or toward streams (Strawberry Creek and its tributaries).

Locally discontinuous and perched water-bearing zones are common in this geologic setting and are indicated by springs, seasonal surface seeps, and variable water levels in wells (LBNL, 2002). These perched conditions are due to several factors, including low permeability bedrock together with pervious sandstone lenses and fractured volcanic rock. Shallow groundwater, which varies throughout the site from 10 to 90 feet below ground surface, appears to be perched on the contact between a bedrock mass with low hydraulic conductivity[1] and the more permeable, fractured volcanic bedrock. In addition, the hydrogeology has been altered throughout the LBNL site by vertical wells and horizontal drains, which were installed to increase slope stability (LBNL, 2002).

There are no production wells at Berkeley Lab. LBNL and surrounding communities receive their water from the East Bay Municipal Utility District (EBMUD). In recent years, LBNL has installed a series of monitoring wells in order to evaluate the environmental quality of the groundwater beneath LBNL. Monitoring wells are also installed at the down-gradient edge of the site perimeter to monitor groundwater leaving the site (LBNL, 2002). Section IV.F, Hazards and Hazardous Materials, provides further detail on the subsurface groundwater contamination that exists in localized groundwater plumes at Building 51.

Building 51 Groundwater Conditions

Groundwater flows beneath Building 51 in a northwest direction through the artificial fill materials and appears to be influenced by the natural topography that underlies the graded cut and fill supporting Building 51 (LBNL, 2005). Water level elevation mapping of the Bevalac area (LBNL, 2005), which was generated from groundwater data collected in the fourth quarter of 2003 (when groundwater was at a seasonal high), indicates that groundwater depths can range between 15 feet and 50 feet below the ground surface, depending on location. Groundwater levels are deeper during the summer months or drought periods when the water table is not recharged by precipitation. Based on the water level map, shallower groundwater depths occur along the base of the slope on the east side of Building 51 (depths of 15 feet to 30 feet) and become deeper

[1] Hydraulic conductivity is the volume of water that will move through a porous material within a certain unit of time and under a certain gradient.

toward the northwest (depths of 30 feet to 60 feet). Groundwater elevations beneath the central portion of Building 51 are relatively level, reflecting the flat surface topography of the Building 51 site (LBNL, 2005).

Regulatory Environment

Federal and State Legislation

The legislation governing the water quality aspects of the project is the Federal Clean Water Act (CWA) and, within California, the Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code). The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The California legislature has assigned the primary responsibility to administer regulations for the protection and enhancement of water quality to the California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). The SWRCB provides state-level coordination of the water quality control program by establishing statewide policies and plans for the implementation of state and federal regulations. The RWQCBs adopt and implement water quality control plans that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems.

NPDES Industrial Activity General Permit

Stormwater generated within the Berkeley Lab facility is currently managed in accordance with LBNL's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activity, as required by the Clean Water Act and the SWRCB. The San Francisco Bay RWQCB and the City of Berkeley provide oversight and enforcement of this permit. Implementation of the permit requirements is detailed in LBNL's Storm Water Pollution Prevention Plan (SWPPP) and Storm Water Monitoring Plan (SWMP).

LBNL's SWMP lists potential sources of stormwater contaminants, including a comprehensive list of hazardous substances, chemicals, or other contaminants used throughout all of the facilities. LBNL has implemented multiple source controls (such as containment systems for leak and spill control and maintenance of storm drains and streets to remove organic material and dirt) and management controls (such as preventive maintenance of equipment and the development of spill prevention and response programs) in order to minimize stormwater pollutants. However, treatment controls (such as oil-water separators and infiltration basins) are generally not used due to the effectiveness of source and management control measures (LBNL, 2002).

The major potential sources of stormwater pollutants at LBNL are automotive vehicles, accidental spills, and earthwork operations during construction. LBNL has developed programs to address accidental spills and also addresses pollution from vehicles through an alternative transportation program that provides employees with commute options other than automobiles. LBNL manages its construction projects to control erosion, sedimentation, and the possible contamination of runoff by construction materials. LBNL maintains a regular sampling program for stormwater and surface water quality.

With certain exceptions (e.g., landscape watering) detailed in the SWPPP, applicable to LBNL as a whole and thus to the project site, LBNL prohibits non-stormwater, municipal water, or wastewater discharges from entering the storm drain system, which eventually flows to Strawberry Creek, because of the chloramine treatment that is added to all municipal water supplies in the area.[2] Municipal, or drinking, water is a concern because EBMUD replaced chlorine as a chemical disinfecting treatment for their supply with chloramine in 1998. Activities that can potentially cause chloramine-treated water to enter the environment through the storm drain include hydrant flushing and vehicle washing. Municipal water or wastewater containing chloramine that is generated from the LBNL site is treated to reduce chloramine concentrations to acceptable levels prior to release to the environment.

If a given project exceeds one acre in disturbed area, as would be the case with the proposed project, LBNL submits a Notice of Intent and seeks coverage under the California General Construction Permit (see below).

NPDES Construction Activity Permit

The CWA provides that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with an NPDES permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial stormwater discharges under the NPDES Program. In November 1990, the U.S. Environmental Protection Agency (EPA) published final regulations that established stormwater permit application requirements for discharges of stormwater to waters of the United States from construction projects that encompass five or more acres of soil disturbance. Regulations (Phase II Rule) that became final on December 8, 1999 expanded the existing NPDES program to address stormwater discharges from construction sites that disturb land equal to or greater than one acre and less than five acres (small construction activity).

California is authorized by EPA to administer its own Clean Water Act permit program for discharges to waters of the United States within California, and under that authority can implement and enforce its own associated regulations as long as these are at least as stringent as EPA's. While federal regulations allow two permitting options for stormwater discharges (individual permits and general permits), the SWRCB has elected to adopt one statewide general permit that applies to all stormwater discharges associated with construction activity. This General Construction Permit requires all dischargers where construction activity disturbs one acre or more to:

- Submit a Notice of Intent (NOI) to obtain coverage under this permit.

[2] Chloramine is a disinfectant added to water for public health protection. It is a combination of chlorine and ammonia that is currently considered best technology for controlling the formation of certain regulated organic disinfection byproducts. Chloraminated water is safe for people and animals to drink, and for all other general uses. However, chloramine is toxic to fish and amphibians.

- Develop and implement a project-specific SWPPP which specifies Best Management Practices (BMPs) that will prevent all construction pollutants, including dirt and silt from erosion and sedimentation, from contacting storm water and entering receiving waters.

- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the nation.

- Perform inspections of all BMPs and maintain documentation of these inspections.

- Implement specific sampling and analytical procedures to determine whether BMPs implemented on a construction site are 1) preventing further impairment by sediment in storm waters discharged directly into waters listed as impaired for sediment or silt, and 2) preventing other pollutants, that are known or should be known by permittees to occur on construction sites and that are not visually detectable in storm water discharges, from causing or contributing to exceedances of water quality objectives. (Note: Strawberry Creek is not currently listed on the SWRCB CWA 303(d) List as impaired for sediment or silt.)

This General Permit is enforced by the RWQCBs. Construction activity subject to the General Construction Permit includes clearing, grading, disturbances to the ground such as stockpiling, or excavation that results in soil disturbances of at least one acre of total land area. Construction activity that results in soil disturbances of less than one acre in size is subject to this General Permit if the construction activity is part of a larger common plan of development that encompasses one or more acres of soil disturbance or if there is significant water quality impairment resulting from the activity.

LBNL would be required to submit an NOI to the SWRCB prior to implementation of the proposed project to obtain coverage under this General Construction Permit.

UC Berkeley Strawberry Creek Management Plan

The Strawberry Creek Management Plan was prepared in 1987 and is currently being updated by UC Berkeley. The streams that dissect LBNL's slopes represent about a quarter of the upper Strawberry Creek watershed. The plan contains recommendations on best management practices that should be used throughout the Strawberry Creek watershed to control non-point-source pollution and reduce degradation of water quality. To ensure compliance with the Strawberry Creek Management Plan, BMPs related to non-point-source pollution at the Building 51 project site should be consistent with those recommended in the Strawberry Creek Management Plan, to the greatest extent feasible.

City of Berkeley General Plan

As a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible. The Environmental Management Element of the City of Berkeley General Plan policies that potentially pertain to the proposed project include:

- Policy EM-23 Water Quality in Creeks and San Francisco Bay: Take action to improve water quality in creeks and San Francisco Bay.

- Policy EM-24 Sewers and Storm Sewers: Protect and improve water quality by improving the citywide sewer system.

- Policy EM-25 Groundwater: Protect local groundwater by promoting enforcement of state water quality laws that ensure non-degradation and beneficial use of groundwater. (City of Berkeley, 2001).

Impacts and Mitigation Measures

Significance Criteria

The impact of an LBNL project on hydrology and water quality would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the California's CEQA Guidelines and the UC CEQA Handbook:

- Violate any water quality standards or waste discharge requirements;

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

- Otherwise substantially degrade water quality;

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;

- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;

- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow; or

- Exceed an applicable LRDP or Program EIR standard of significance.

The Initial Study (see Appendix A) found that the project would not substantially deplete groundwater supplies, interfere substantially with groundwater recharge, or expose people or structures to flooding or inundation by seiche, tsunami, or mudflow. These topics are therefore not discussed further in this section.

Measures Included as Part of the Project

The following impacts relevant to hydrology and water quality have been anticipated and analyzed pursuant to CEQA as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered:

Impact III-C-1:	LBNL is not located in a flood-plain area. Continued University operation of LBNL, including continued implementation of the 1987 LRDP, is not expected to increase off-site flood hazard, erosion, or sedimentation. The project is not expected to deplete groundwater resources, interfere with groundwater recharge, or degrade surface or groundwater quality substantially.
Impact III-C-2:	Continued University operation of LBNL, including continued implementation of the 1987 LRDP, could produce increased surface and storm runoff.
Cumulative Impacts:	Summary: Implementation of all hydrology mitigation measures relevant to cumulative development, and compliance with all applicable laws, will result in less than significant impacts on hydrology. However, cumulative development in the City of Berkeley may adversely impact water quality, as well as potentially result in erosion and sedimentation of drainage facilities.

The following hydrology, water quality, and geology, soils, and seismicity mitigation measures, adopted as part of the 1987 LRDP EIR, as amended, are already required for the proposed project and are therefore incorporated as part of the project description:

Mitigation Measure III-B-2a:	Excavation and earth moving will be designed for stability, and accomplished during the dry season when feasible. Drainage will be arranged to minimize silting, erosion, and landsliding. Upon completion, the land will be restored, covering exposed earth with planting.

Mitigation Measure III-B-2d:	Revegetation of disturbed areas, including slope stabilization sites, using native shrubs, trees, and grasses, will be included as part of all new projects.
Mitigation Measure III-C-2:	Each individual project will continue to be designed and constructed with adequate storm drainage facilities to collect surface water from roofs, sidewalks, parking lots, and other surfaces and deliver it into existing channels which have adequate capacity to handle the flow.
Cumulative Impacts:	Summary: Potential adverse impacts to water quality can be reduced if LBNL adopts feasible mitigation measures to control surface water runoff, prevent erosion, and maintain adequate drainage facilities.

These measures would be applied to the project using the mechanism of the project-specific SWPPPs required under the California General Construction Permit, which incorporates by reference the SWPPP and SWMP.

Impacts

Impact IV.G-1: Wastewater and runoff associated with the proposed project could become contaminated by various sources on the demolition site and could enter the stormwater system or the adjacent environment. The SWPPPs developed for the various phases of the proposed demolition project would reduce the potential for pollutants to affect water quality in downstream receiving water courses, municipal wastewater systems, or natural aquatic habitats. (Less than Significant)

As with many large construction projects, the proposed project would require the management of water generated from dust suppression activities, rainfall, and, because of the seasonally shallow groundwater, excavation or basement dewatering. Management of the surface water is necessary to avoid entrainment of pollutants such as asbestos, lead, and silica in concrete dust. Also, construction equipment used on-site may release small quantities of petroleum products including diesel, gasoline, and grease that could be combined in the wastewater. The proposed project also would involve the management of some materials, such as some concrete shielding blocks, that have induced or surface radioactivity (see Section IV.F, Hazards and Hazardous Materials).

Water generated during the project that comes into contact with the project site is referred to in this analysis as “demolition contact wastewater.” The actual quantity of demolition contact wastewater that would be generated by the proposed project activities is not known; however, for the purposes of this impact analysis, it is assumed that small quantities of wastewater would be generated at the site on each day of demolition activities. Amounts of groundwater that may be generated are difficult to estimate. However, LBNL estimates that approximately 350 gallons of groundwater per day flow beneath the project area during the September dry season and up to approximately 4,750 gallons of groundwater per day flow through the same area during the December wet season. The upper end of this range is conservatively doubled for planning purposes to a range of 350 to 9,500 gallons of groundwater per day on the site throughout the

year. Some portion of this daily groundwater flow would be considered demolition contact wastewater.

The actual quantities of water generated would depend on such variables as the type of equipment used to break concrete, the amount of water discharged from excavations, and the elevation of the groundwater levels. This analysis assumes that demolition activities would continue through the winter and that stormwater management techniques would be used to reduce the contact of stormwater with residual contaminants at the demolition site.

The BMPs used by LBNL are described in its 2002 sitewide SWPPP. The specific details of the demolition process and the most effective BMPs for controlling surface runoff, preventing erosion, and maintaining adequate drainage at the project site will be developed by LBNL staff and contractors in project-specific SWPPPs as the specifics of the demolition activities are further defined. As required by the statewide General Construction Permit, the preparation and implementation of SWPPPs will ensure that pollutants would not enter the environment through uncontrolled runoff. On-going groundwater monitoring (see Section IV.F) would not be disturbed.

The project-specific SWPPPs would address each aspect or phase of the demolition project and describe the BMPs necessary to remedy potential stormwater management issues. LBNL would require each subcontractor operating on the project site to develop and be accountable to a SWPPP, which would define procedures and BMPs necessary to manage and discharge wastewater generated during the phases of deconstruction. The subcontractor would be responsible for preparing and implementing the SWPPP, while LBNL would oversee acceptable implementation through regular inspection of the BMPs.

Each SWPPP would address in detail the particular wastewater management issues and procedures that are unique to the individual demolition phase or activity. For example, contractors involved in aboveground concrete demolition would develop the necessary BMPs for management of water used for concrete dust suppression; contractors working in subgrade areas or excavations would use BMPs designed to address seepage of groundwater or water accumulated on the subgrade floor of Building 51. The development of the specific procedures would rely on the fact that the building site and pad site are paved, so water on the site could be controlled in a relatively straightforward and reliable manner.

Examples of BMPs that LBNL could require as part of the project, all but the last from the LBNL 2002 facility-wide SWPPP, include the following:

- Any excavated soil that is stockpiled would be covered with weighted plastic during rain events.

- Storm drains would be protected from soil or other materials by placement of a cover, filter fabric, or other measure during demolition activities.

- Good housekeeping practices requiring orderly storage of materials and proper clean-up would be implemented throughout the demolition site.

- Hazardous materials would be stored in closed containers and away from storm drain locations.

- Water from concrete cutting activities or other concrete breaking or sawing would be contained and immediately vacuumed up.

- If necessary, specific locations would be designated on-site for concrete dust washing. Concrete residue would be allowed to harden and then would be disposed of as trash, avoiding discharge to storm drains.

- Site winterization would employ LBNL's BMPs and would include covering open tanks and lined ponds that hold demolition contact water, if these are present (such water usually would be stored in already-covered tanks); routing water away from areas that may contain residual construction waste material and petroleum; and inspecting storm drains to ensure that on-site flooding does not occur or waste materials are not flushed with clean stormwater.

- All demolition contact water generated during deconstruction operations would be contained in tanks or lined ponds and tested to determine final disposal method. Testing to determine disposal pathway would follow applicable state and federal guidelines for characterizing and profiling waste material.

- A self-contained station would be set up where truck wheels would be cleaned to prevent dirt from leaving the site by this route. Water would be captured and recycled in this system. This station would use as little water as possible incorporating dry cleaning methods, high-pressure sprayers, and a positive shutoff valve. The station would be located away from storm drain inlets and drainages. Discharge water would be collected and disposed of in accordance with all applicable laws and regulations.

Enforcement of SWPPPs and the required BMPs would be the responsibility of LBNL site monitors who would be on-site during all demolition operations to ensure that contractors comply with the stormwater/wastewater management plans. These monitors would have the ability to authorize contractors to immediately correct non-compliant conditions or order work to stop until such conditions were corrected.

Demolition contact water would be managed by BMPs as specified in SWPPPs required by LBNL for each subcontractor. These SWPPPs and the BMPs they require would be in compliance with state and federal regulations and subject to regular inspection by LBNL staff. The management and disposal of all demolition contact wastewater and stormwater, and regular inspection of wastewater management procedures, would ensure that impacts from the generation of contact wastewater would be less than significant. It is anticipated that groundwater determined to be clean can be discharged to the storm drain. Groundwater that is found to be

contaminated would be treated to an acceptable level and discharged under permit to the sanitary sewer system.

Mitigation: None additional required.

Impact IV.G-2: The change in site use following the demolition of Building 51 would result in an overall decrease of pollutants in the stormwater discharged from the area. (No Impact)

The removal of the Building 51 facility and conversion of the property to vacant space would decrease the levels of oil and grease, metals, and sediment in stormwater runoff from the site, due to the removal of potential pollutant sources and the increased infiltration capacity of the permeable fill placed on the site.

Mitigation: None required.

Impact IV.G-3: Under post-demolition conditions, the proposed project would not increase, and under some stormwater conditions, would locally decrease, stormwater runoff rates and volumes. (Less than Significant)

Stormwater runoff from the proposed project site is currently discharged to the North Fork of Strawberry Creek. This condition would not change under the post-project site configuration. Following the demolition and removal of Building 51 and its foundation, the demolition zone would be converted to vacant space and hydro-seeded with native grasses. This would allow varying amounts of surface water to percolate into the ground rather than flow along the surface, especially early in the rainy season when soil conditions are not yet saturated. The percolation of surface water into the ground would slightly reduce the overall quantity of surface water runoff. Because the proposed project would cause stormwater runoff on the subject site either to be slightly reduced or to remain the same as under existing conditions, the impact on runoff rates and volumes discharged to the North Fork of Strawberry Creek would be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact IV.G-4: The proposed project, together with other proposed LBNL development projects and other development projects at UC Berkeley and within the city of Berkeley, would result in less-than-significant cumulative hydrologic and water quality impacts. (Less than Significant)

This cumulative impact analysis considers changes in drainage and water quality within the Strawberry Creek watershed and the impact that the proposed project would have on that watershed. Because Strawberry Creek and its tributaries drain through LBNL, UC Berkeley, and the city of Berkeley, the analysis considers development in those areas and not exclusively at LBNL. During proposed project implementation, stormwater runoff and demolition contact water would be managed, controlled, and treated as outlined in the sitewide SWPPP and in SWPPPs prepared for each particular phase of the project to address stormwater management issues and assign BMPs. Through compliance with NPDES construction activity permit regulations, thorough implementation of SWPPPs, and regular monitoring of BMP efficiency by LBNL, the proposed project would not cause increased stormwater flows or discharges of polluted runoff that would be capable of altering drainage or degrading water quality within Strawberry Creek. Since the project would not alter natural hydrology or discharge pollutants to Strawberry Creek, the incremental contribution of the proposed project to cumulative hydrology and water quality impacts would not be cumulatively considerable.

Following project completion, the former Building 51 site would be converted to vacant space suitable for future, though undetermined, development. Such a conversion would result in no additional stormwater runoff from the site and could decrease flows under certain storm events. As with the short-term project conditions discussed above, since there would be no increase in runoff from the site under post-project conditions, the long-term effect would not be cumulatively significant.

The project would not generate additional stormwater or pollution that would degrade water quality in Strawberry Creek. The 1987 LRDP EIR, as amended, considered the effects of stormwater quality and quantity resulting from constructing and operating all buildings in the entire LBNL site. The area occupied by the development considered in the 1987 LRDP EIR, as amended, would have greater square footage and more total impervious area than current conditions, or conditions after the completion of the proposed project. Therefore, the effects on the quantity and quality of stormwater from the proposed project are well within those considered in the 1987 LRDP EIR and have already been accounted for in LBNL's site-wide stormwater management planning.

Most other on-site LBNL development would have some water quality and stormwater drainage demand impacts that correspond to converting pervious surfaces into impervious surfaces. However, LBNL projects would be required to comply with LBNL’s NPDES permit and associated SWPPP and SWMP, and this project will in general reduce impervious surfaces. Other projects occurring on the UC Berkeley campus and in the city of Berkeley would generally occur incrementally, and most often within already developed (and impervious) areas. Potential cumulative hydrology and water quality impacts associated with the proposed project would not result in a significant cumulative impact.

Please refer to the cumulative impacts discussion in Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None additional required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts on hydrology and water quality. The proposed project would incorporate Mitigation Measures III-B-2a, III-B-2d, and III-C-2 from the 1987 LRDP EIR, as amended.

Building 51 Demolition Project-Specific Mitigation Measures: None required.

References –Hydrology and Water Quality

Association of Bay Area Governments (ABAG), *Manual of Standards for Erosion and Sediment Control Measures*, 1995.

California Stormwater Quality Association (CASQA), *Stormwater Best Management Practice Handbook for New Development and Redevelopment*, prepared by Camp Dresser & McKee and Larry Walker Associates, January 2003.

City of Berkeley, *City of Berkeley General Plan: A Guide for Public Decision-Making*, 2001.

Federal Emergency Management Agency (FEMA), *Hazard Mapping through ESRI Website*, http://www.esri.com/hazards, accessed February 2005.

Lawrence Berkeley National Laboratory (LBNL) *Environment, Health and Safety Division, Draft Corrective Measures Study Report*, http://www.lbl.gov/ehs/erp/html/documents-draft-cms.shtml, February 2005.

Lawrence Berkeley National Laboratory (LBNL), *Storm Water Pollution Prevention Plan*, Revision 3, June 1, 2002 [2005 revision in progress].

Lawrence Berkeley National Laboratory (LBNL), *Storm Water Monitoring Program*, December 2001.

Lawrence Berkeley National Laboratory (LBNL), *Lawrence Berkeley Laboratory Long Range Development Plan*, August 1987.

H. Land Use and Planning

Introduction

This section discusses existing land uses at the project site and vicinity and also describes land use plans and policies that are applicable to the project. The potential for the project to result in an adverse physical land use impact or to conflict with existing land use plans and policies are also analyzed.

Setting

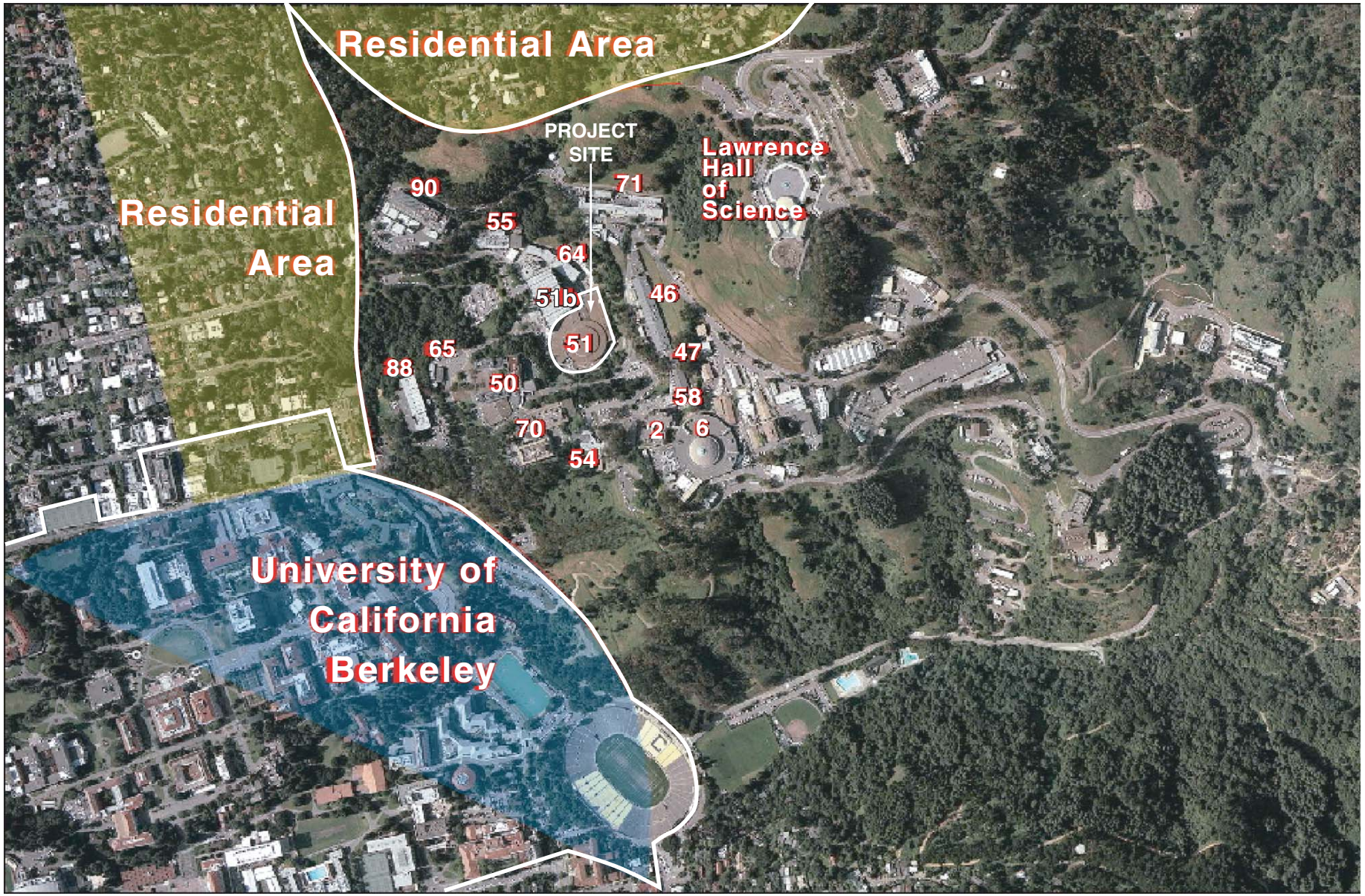
Location and Existing Land Uses

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory totals approximately 200 acres, and is located on the hillside above the campus of the University of California, Berkeley. LBNL is located on land owned by the University of California and operated by the University under contract to the U.S. Department of Energy. The Laboratory is surrounded by open space, institutional uses, and residential and neighborhood commercial areas. South and southeast of LBNL is the approximately 1,230-acre UC Berkeley campus, operated and maintained by the University of California. The UC Berkeley campus includes the open space areas of Strawberry Canyon southeast of LBNL. Residential neighborhoods and a small, one-block neighborhood commercial area in the City of Berkeley lie to the north and northwest. Regional open space, including the 2,000-acre Tilden Regional Park, lies to the northeast. The 205-acre Claremont Canyon Regional Preserve is south of LBNL. **Figure IV.H-1**, an aerial photograph, shows Building 51 in the context of surrounding land uses.

Project Site

Building 51 is located adjacent to Lawrence Road and McMillan Road at LBNL. (See also Figures III-1 through III-4, presented in Chapter III, Project Description.) Current uses on the project site include limited office, research, and equipment storage. The site has been minimally active for scientific research activities since operation of the Bevatron ceased in 1993. Laboratory, office, engineering, and computing functions occupy the LBNL buildings immediately adjacent to Building 51. Surrounding land uses include residential areas to the north of the LBNL property line; LBNL buildings and UC Berkeley athletic fields to the south; LBNL buildings and UC Berkeley student housing, amphitheater, and classrooms to the west; and additional LBNL buildings and the UC Berkeley Lawrence Hall of Science to the east. Building 51 is approximately 1,100 feet from the nearest residences to the west and north, and about 1,300 to 1,400 feet from the Lawrence Hall of Science to the east.



SOURCES: LBNL (2005) and ESA (2005)

Figure IV.H-1
Land Uses in the Vicinity of the Site

Existing Plans and Policies

LBNL Long Range Development Plan (LRDP)

The Long Range Development Plan (LRDP) for LBNL was approved by The Regents of the University of California in 1987. The LRDP organizes the LBNL site into seven functional planning areas to consolidate related functions, maximize efficiency, and establish a network of roadways, pedestrian paths, and parking to minimize hazards to employees and the public. The project site is in the functional planning area designated by the LRDP as the "Bevalac Accelerator Complex," which is "a center for nuclear physics, radiobiology, and accelerator research" (LBNL, 1987). The 1987 LRDP called for the addition of approximately 149,300 gross square feet and removal of approximately 29,600 gross square feet of building space in the Bevalac Accelerator Complex. According to the 1987 LRDP, "Design guidelines in the LRDP have been developed to achieve specific facilities planning requirements while respecting site constraints and providing coherence among building elements and the landscape." These guidelines address the following areas: open space and outlook, landscaping and visual enhancement, topography and grading, utilities corridors, building mass and orientation, building exteriors, building flexibility, energy and operational efficiency, circulation and parking, and guideline review process.

City of Berkeley General Plan

As a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible. The City of Berkeley General Plan is a statement of community priorities developed to guide public decision-making. The General Plan land use designations for most of the areas within the University of California lands are Institutional and Open Space. The General Plan land use designation for the project site is Institutional. Institutional areas of Berkeley are for institutional, government, educational, recreational, open space, natural habitat, woodlands, and public service uses and facilities, such as the University of California, BART, Berkeley Unified School District, and East Bay Municipal Utility District facilities. Berkeley General Plan Policy LU-35 states that the City of Berkeley shall "develop and foster close working relationships with the University of California to ensure and facilitate land use decisions that are mutually beneficial to the institution and the adjoining neighborhoods" (City of Berkeley, 2001).

Impacts and Mitigation Measures

Significance Criteria

As more fully described in the 1987 LRDP EIR, as amended, potential impacts on land uses could result from continued University operation of LBNL, including continued facility development as contemplated in the 1987 LRDP. The impact of LBNL projects on land use and planning policies

would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the state CEQA Guidelines and the UC CEQA Handbook:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (i.e., the LRDP) adopted for the purpose of avoiding or mitigating an environmental effect;
- Conflict with any applicable habitat conservation plan or natural community conservation plan; or
- Exceed an applicable LRDP or Program EIR standard of significance.

Surrounding communities would not be subject to physical division by the proposed demolition. The LBNL site is not subject to or designated for any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved conservation plan.

Measures Included as Part of the Project

The following impacts relevant to land use and planning policies have been anticipated and analyzed pursuant to CEQA as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered:

Impact III-G-1:	There are no LBNL-proposed developments in the site development plan which would impact directly on the privately owned multiple-family or single-family housing along the LBNL western and northern boundaries.
Impact III-G-2:	Continued operation of LBNL by the University, including continued implementation of the 1987 LRDP, would result in the conversion of a small amount of open space into urban- or suburban-scale uses.
Impact III-G-3:	Continued operation of LBNL by the University, including continued implementation of the 1987 LRDP, would be consistent with the 1990 UC Berkeley Long Range Development Plan, and the General Plans of the City of Berkeley and the City of Oakland.

Because the project would involve demolition of a building rather than construction or development of any new building, Mitigation Measure III-G-2, which provides that buildings proposed for development at LBNL follow the Design Guidelines contained in the LBNL Long Range Development Plan, adopted as part of the 1987 LRDP EIR, as amended, is not be applicable to the proposed project. Impacts III-G-1 and III-G-3 were identified as "Less Than Significant Impacts for Which No Mitigation Measures Are Suggested," and so are not associated

with a mitigation measure. Therefore, the proposed project does not include any land use-related mitigation measures from the 1987 LRDP EIR, as amended.

Impacts

Impact IV.H-1: Proposed demolition activities would create temporary and intermittent impacts that could affect adjacent land uses. (Less than Significant)

Demolition activities would have physical effects, discussed in Sections IV.K Transportation/ Traffic, IV.C Biological Resources, IV.G Hydrology and Water Quality, IV.I Noise, and IV.B Air Quality, that in turn could affect adjacent land uses. As discussed in Chapter III, Project Description, demolition activities would occur beginning in 2006 and would possibly extend through 2012. Demolition activities would include the removal of building structures, shielding blocks, metal yokes, and other metal equipment, and demolition and removal of slabs, foundations, and subsurface structures. For additional analysis of demolition impacts, please refer to the above-identified sections. Mitigation measures identified in the above-identified sections would mitigate all potential demolition-associated land use impacts to a less-than-significant level.

Mitigation: None required.

Impact IV.H-2: The proposed project would result in a change of use on the project site. (Less than Significant)

Existing uses of Building 51 include limited office, research, and equipment storage. The project would demolish Building 51 and the Bevatron that it houses. As stated in Chapter III, Project Description, the project site comprises approximately four acres, including parking and staging areas. Of this, approximately 2.25 acres would be converted from developed area (i.e., occupied by Building 51) to an undeveloped area for an indeterminate time. At the completion of the project, the 2.25-acre demolition zone would be backfilled, compacted, and hydroseeded. Until another project is proposed, approved, and initiated, no buildings would exist in the demolition zone, and it would revert to an undeveloped area within a developed, institutional setting.

The project site is in the western portion of the LBNL site, within the city limits of Berkeley. As described earlier, although LBNL seeks to cooperate with local jurisdictions in addressing the physical consequences of potential land use conflicts, the Laboratory is generally exempted by the federal and state constitutions from compliance with local land use regulations, including general plans and zoning. The City of Berkeley's General Plan designates the area as Institutional. Demolition of the facility would be consistent with this designation.[1]

[1] In the Land Use element of the Berkeley General Plan, the classification of "Institutional" denotes "areas of the City for institutional, government, educational, recreational, open space, nature habitat, woodlands, and public service uses and facilities, such as the University of California..."

Demolition of the facility also would be consistent with the 1987 LRDP. The proposed project would not result in the addition of any new development at LBNL and the change in land use from limited office, research, and equipment storage to an undeveloped area within an institutional setting would not result in a significant land use impact.

Revegetation would be in accordance with the 1987 LRDP. As set out in that document, landscape planting areas are established throughout the Laboratory grounds to sustain or augment the shrub, grassland, and forest areas of the Laboratory. Major landscaping goals are to:

- Complement the hillside setting;
- Unify the site visually;
- Relate the site to adjacent vegetation of the Berkeley Hills;
- Prevent erosion;
- Provide amenities to users of the site; and,
- Provide a buffer between functional areas, building and adjacent properties.

Although not yet completed or approved, a new LRDP for LBNL is in progress. In November 2000, a Notice of Preparation (NOP) was issued for this LRDP and its associated LRDP EIR. A NOP was reissued in October 2003. The new LRDP would project growth and development at LBNL for approximately the next 20 years. The draft LRDP and new LRDP EIR are expected to circulate for public review in 2006. The proposed Building 51 demolition project would be reflected and accounted for in the new LRDP and new LRDP EIR.

The proposed project would not exceed a standard of significance established by the programmatic 1987 LRDP EIR, as amended. Land use and planning impacts would be less than significant and no project-specific mitigation measures would be required.

Mitigation: None required.

Cumulative Impacts

Impact IV.H-3: The project could potentially contribute to a significant cumulative land use impact. (Less than Significant)

The proposed demolition is consistent with the 1987 LRDP. Further, the proposed project would not result in the addition of any new development at LBNL, and the change in land use from limited office, research, and equipment storage to an undeveloped area within an institutional setting would not result in a significant land use impact. Because the project would not result in

any significant land use impacts, the proposed project would make no cumulatively considerable contribution to adverse land use impacts, at LBNL or in Berkeley.

Please refer to the cumulative impacts discussion in Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts related to land use and planning.

Building 51 Demolition Project-Specific Mitigation Measures: None required.

References –Land Use and Planning

City of Berkeley, *City of Berkeley General Plan: A Guide for Public Decision-Making*, 2001.

Lawrence Berkeley National Laboratory (LBNL), *Lawrence Berkeley Laboratory Long Range Development Plan*, August 1987, p. 56.

I. Noise

Introduction

This section discusses the existing noise environment in the project area and the regulation of noise. In addition, the section analyzes the potential for the project to affect ambient noise at nearby "sensitive receptor areas," such as residences. Noise effects on wildlife are considered in Section IV.C, Biological Resources.

Setting

Technical Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic scale in units of decibels (dB) is used to measure sound pressure level, with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations are measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. Therefore, the sound pressure level constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies and greater sensitivity to mid-range frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

Noise Exposure and Community Noise

An individual person's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. Rather, community noise varies

[1] All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

continuously over time with respect to the contributing sound sources. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short-duration single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment affect and change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The equivalent sound level, used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level measured during the measurement period of interest.

L_{min}: The instantaneous minimum noise level measured during the measurement period of interest.

L_x: The sound level that is equaled or exceeded x percent of a specified time period. The L_{50} represents the median sound level (i.e., the noise level exceeded 50 percent of the time).

DNL: The day-night average sound level, which is the energy average of the A-weighted sound levels occurring during a 24-hour period, accounting for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted by adding 10 dBA to take into account the greater annoyance of nighttime noises.

CNEL: The Community Noise Equivalent Level. Similar to the DNL, but adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Without appropriate hearing protection, workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Therefore, an important way of predicting human reaction to a new or changed noise environment is to evaluate the way the noise levels compare to the existing environment to which one has adapted: the so-called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause adverse response.

These relationships occur in part because of the physical characteristics of sound, the fact that the human ear perceives sound in a non-linear fashion, and the logarithmic nature of the decibel system. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (e.g., atmospheric conditions and noise barriers, either vegetative or manufactured). Thus, a noise measured at 90 dBA 50 feet from the source would be about 84 dBA at 100 feet, 78 dBA at 200 feet, 72 dBA at 400 feet, and so forth. Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate, approximately 3 to 4.5 dBA per doubling of distance from the source.

Vibration Principles

Vibration refers to groundborne noise and perceptible motion. Sources of vibration include explosions, machinery, traffic, trains, and construction equipment. Vibration sources can also be described as continuous, such as factory machinery, or transient, such as freight trains or truck

passbys. There are limited standards established to measure vibration impacts. For example, neither the Federal Highway Administration (FHWA) nor the California Department of Transportation (Caltrans) has established vibration standards.

The most common impacts from vibration include annoyance, damage to structures and/or equipment, disruption of vibration-sensitive operations or activities, and triggering of landslides. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibrations from most construction activities very rarely reach the levels that can damage structures, but can achieve the audible and feelable ranges in buildings very close to construction sites (FTA, 1995). Certain activities such as pile driving, pavement breaking, blasting, and demolition of structures generate vibrations potentially damaging to buildings at distances of less than 25 feet from the source (Caltrans, 2002). At 50 feet, vibrations are readily perceptible but pose virtually no risk of damage to normal buildings. Historic buildings, buildings in poor condition, or buildings previously damaged in earthquakes can sustain building damage from pavement breaking and extensive pile driving within 50 to 100 feet from the source (Caltrans, 2002).

Existing Noise Environment

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets, noise levels typically range from 65 to 70 DNL. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

The Building 51 project site is located on a large parcel of flat land along Lawrence Road and McMillan Road. The primary sources of noise at the project site are activities from the operation of the adjacent buildings and noise from the LBNL shuttle buses, trucks, and other vehicles.

Sensitive Receptor Areas

Some land uses are considered more sensitive to ambient noise levels than others because of the duration of noise exposure as well as the types of activities that typically occur there. People in residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, natural areas, parks and outdoor recreation areas are generally more sensitive to noise than are people at commercial and industrial establishments. Housing, outdoor recreation, and similar land uses are therefore considered "sensitive receptor areas" for noise.

Figure IV.I-1 shows the position of Building 51 in relation to other LBNL buildings as well as the nearest sensitive-receptor areas to the north, east, and west; there are no nearby sensitive receptor areas to the south. The noise-sensitive land uses are as follows:

- **Area 1** – This area to the west consists of the Nyingma Institute (Buddhist facility) and single- and multi-family residences. This area is approximately 1,100 to 1,400 feet west of Building 51 and approximately 160 to 250 feet lower in elevation. As a result of

intervening hillside terrain and building structures, there is no direct line-of-sight between any of the residences or the Buddhist facility and Building 51.

- **Area 2** – This area to the north consists of single-family residences along Campus Drive, Olympus Avenue, and Summit Road. The nearest residences are located on Campus Drive approximately 1,100 feet north of Building 51 and are approximately 270 feet higher in elevation. A partial line-of-sight exists between some of these residences and Building 51, although none has a completely unobstructed view due to the intervening terrain and building structure.

- **Area 3** – To the east is the UC Berkeley Lawrence Hall of Science Museum (LHS), which is located approximately 1,300 to 1,400 feet away from Building 51. The LHS rests on a hillside approximately 350 feet higher than Building 51. No line-of-sight exists between Building 51 and the buildings at LHS because LHS is offset from the edge of the hillside. However, a person standing directly in front of the 3.5-foot-tall boundary wall at the edge of the hillside where the LHS property faces Building 51 would have a partial line-of-sight.[2] This wall is at the boundary of the LHS outdoor area where children often play on the outdoor fixtures. The play fixtures themselves do not have a line-of-sight to Building 51.

Appendix D, *Noise Study for the Demolition of Building 51,* describes these three areas in more detail.

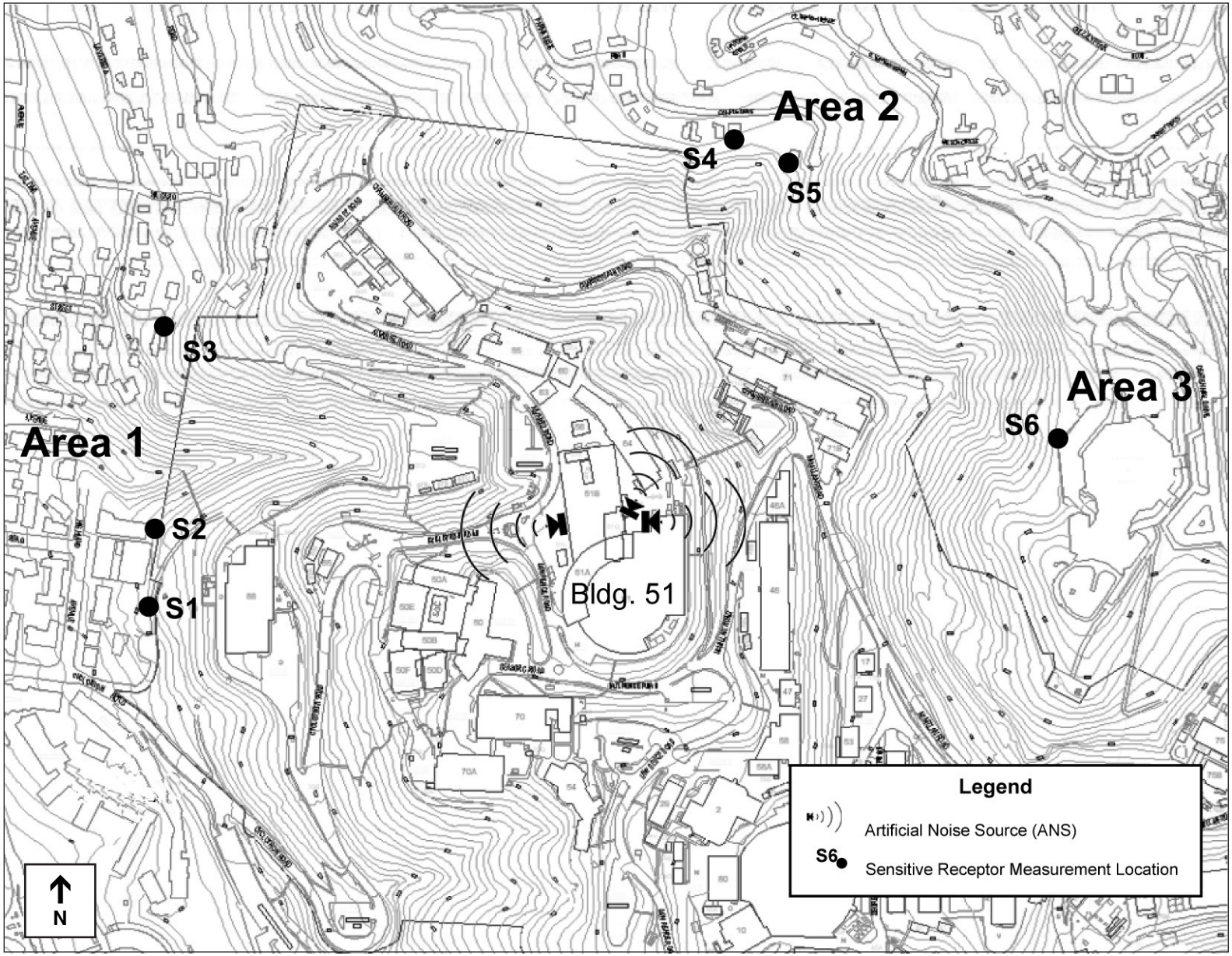
Existing Noise Levels

As shown in **Figure IV.I-1**, the average existing noise levels were measured at six sites in the three areas described above. **Table IV.I-1** lists the measured background noise levels.

Noise measurements taken in connection with the ongoing preparation of the LBNL Long-Range Development Plan EIR indicate that hourly average noise levels at locations measured nearest Building 51 range between 52 and 66 decibels (dBA, Leq[3]). Maximum noise levels measured were between 61 and 83 dBA, with the second highest reading (74 dBA) at Building 71, near the top of the McMillan Road grade. These levels likely were the result of shuttle bus traffic on the hill.[4]

A less frequent but regular noise source is a nearby 2-megawatt diesel emergency power generator, located approximately 200 feet northwest of Building 51 and abutting the tree line. This generator is tested monthly for a minimum of four hours, and it creates noise of up to 85 dB at a distance of 50 feet. In addition, regular vegetation management is performed in and around the area of trees under analysis. This management includes use of equipment such as weed-whackers, leaf blowers, chippers, and chain saws.

2 There is also a partial line-of-sight between Building 51 and the LHS north parking area.
3 Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements; Leq represents the constant sound level which would contain the same acoustic energy as the varying sound level.
4 All noise readings were based on 15-minute measurements.



SOURCE: Parsons (2003)

Figure IV.I-1
Sensitive Noise Receptor Locations

TABLE IV.I-1

AVERAGE EXISTING BACKGROUND NOISE LEVELS AT SENSITIVE RECEPTOR LOCATIONS

Measurement Location (see Figure IV.I-1)	Average Existing Background Noise Level (dBA)	Noise Sources
Site 1	54	Distant roadway noise
Site 2	46	
Site 3	44	
AREA 2		
Site 4	54	Intermittent distant construction noise
Site 5	52	
AREA 3		
Site 6 (at wall)	54	Distant construction noise and children playing on Lawrence Hall of Science outdoor fixtures
Site 6 (15 ft. from wall)	53	

SOURCE: Parsons (2003)

Regulatory Environment

As a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible. Noise standards are typically addressed in local general plan policies and noise ordinances. For this analysis, demolition noise standards, which are described in noise ordinances rather than general plans, are considered.

The City of Berkeley's Community Noise Ordinance (City of Berkeley Municipal Code at Section 13.40.070 B. 7. b.) states that where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum sound levels at affected properties will not exceed listed levels. These levels vary according to the zoning of the area affected. **Table IV.I-2** lists maximum sound levels for construction and demolition noise lasting 10 days or more from stationary equipment. With certain exceptions, the Noise Ordinance prohibits operating tools and equipment used in construction and demolition between 7:00 p.m. and 7:00 a.m. on weekdays and between 8:00 p.m. and 9:00 a.m. on weekends or holidays if the sound would create a noise disturbance across a residential or commercial real property line.

Impacts and Mitigation Measures

Significance Criteria

The noise impacts of LBNL projects on the human environment would be considered significant if they would exceed the following Standards of Significance, in accordance with Appendix G of the state CEQA Guidelines and the UC CEQA Handbook:

TABLE IV.I-2

CITY OF BERKELEY MAXIMUM SOUND LEVELS FOR LONG TERM OPERATION OF STATIONARY EQUIPMENT

Land Use (Zoning)	Daily: 7:00 a.m. to 7:00 p.m.	Weekends and Legal Holidays: 9:00 a.m. to 8:00 p.m.
Single-family and duplex residential (R1, R2)	60 dBA	50 dBA
Multi-family residential (R3 and above)	65 dBA	55 dBA
Commercial/Industrial	70 dBA	60 dBA

SOURCE: City of Berkeley (2005)

- Exposure of persons to or generation of noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels;
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels; or
- Exceed an applicable LRDP or Program EIR standard of significance.

The Initial Study (see Appendix A) found that the project would not result in a substantial permanent increase in ambient noise levels and would not expose people to airport-related noise, since there are no airports or airstrips in the project site vicinity. These topics are therefore not discussed further in this section.

Demolition-related noise associated with the proposed project was analyzed to assess whether the project would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. The noise level used as the standard for determining the impact of such noise on sensitive receptor areas varies according to the time of day. In general, demolition noise is considered a significant impact if it would exceed the City of Berkeley Noise Ordinance standards listed above. At the same time, it is important to remember that a noise increase of 3 dBA is generally regarded as the minimum perceptible increase. For this

analysis, in situations where the ambient noise levels without the project already exceed the Noise Ordinance standards for affected land uses, this 3-dBA increase is used as a standard instead.

Measures Included as Part of the Project

The following impacts relevant to noise levels have been anticipated and analyzed pursuant to CEQA as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered:

Impact III-K-1:	Ambient noise levels from the University's continued operation of LBNL will generate noise levels which could conflict with applicable noise ordinances and standards.
Impact III-K-2:	Construction activities resulting from continued implementation of the 1987 LRDP could create significant adverse noise impacts on-site.
Cumulative Impacts:	No cumulative noise impacts are anticipated from anticipated cumulative development at and in the vicinity of LBNL.

As a result of anticipated impacts to noise levels, the following mitigation measures, adopted as part of the 1987 LRDP EIR, as amended, are already required for the proposed project, and therefore are incorporated as part of the proposed project's description.

Mitigation Measure III-K-1:	Projected noise levels will be compared with ambient noise levels and the Berkeley Noise Ordinance limits, or other applicable regulations. Acoustical performance standards would be included in future contract documents. LBNL will continue to design, construct and operate buildings and building equipment taking into account measures to reduce the potential for excessive noise transmission.[5]
Mitigation Measure III-K-2:	Noise-generating construction equipment will be located as far as possible from existing buildings. If necessary, windows of laboratories or offices will be temporarily covered to reduce interior noise levels on-site.

Impacts

Impact IV.I-1: Demolition activities associated with the project would generate intermittent and temporary noise levels that would increase off-site ambient noise levels above existing levels. (Less than Significant)

[5] "Demolition" is substituted for "construction" and "building" as necessary in the application of these mitigation measures to demolition projects at LBNL.

As described in Chapter III, Project Description, all work related to disassembly and removal of the internal structures (i.e., the concrete shielding blocks and the Bevatron apparatus) would occur while the exterior structure of Building 51 is in place. The exterior structure would then be demolished. After demolition of the building, the slab and foundation structure would be demolished. Final tasks would include excavating contaminated soils, if necessary, followed by backfilling of the site. Demolition work would be performed approximately 40 hours per week, Monday through Friday; normal work hours would be between 7:00 a.m. and 3:30 p.m. It is possible that some truck loading and departure would take place on Saturdays and/or Sundays, although this would be infrequent.

The degree to which noise generated by the project would affect sensitive receptor areas depends upon the noise level generated by the equipment used, the distance between noise sources and the nearest noise-sensitive uses, and the existing noise levels at those locations. Demolition noise levels fluctuate depending on the particular type, number, and duration of use of various types of equipment. **Table IV.I-3** describes typical demolition equipment noise levels measured 50 feet away from the noise source.

This noise analysis calculated demolition noise for a scenario consisting of several pieces of demolition equipment shown in **Table IV.I-3** operating simultaneously. The usage of demolition equipment would vary during the various stages of the project.[6] Three basic stages of demolition were assumed developed for the purposes of noise prediction: 1) dismantling and removal of the shielding blocks and Bevatron yokes, and the general demolition of the building; 2) demolition of the foundation and substructure; and 3) back filling, grading, and compaction. **Table IV.I-4** shows the demolition equipment required during each of these stages as well as the noise levels at 50 feet that would be generated by this equipment.

As shown in **Table IV.I-4,** as a result of the need to use impact equipment to break up concrete, the loudest demolition work would occur during demolition of Building 51's foundation and substructure. This concrete-breaking work, using a hoe-ram impact hammer, would be expected to generate noise levels as high as 96 dBA when measured at 50 feet. During the last part of this stage of demolition, there would be no Building 51 in place to partially shield the sound.

To determine the potential noise impacts on sensitive receptors, noise tests and calculations were conducted to measure sound propagation from Building 51 to the nearest sensitive receptor areas. The tests used an artificial noise source producing a noise level of 95 dBA at 50 feet.[7] This artificial noise source served as a surrogate for noise levels associated with the loudest stage of

6 The equipment listed would not be exactly what would be used for the actual demolition of Building 51. Rather, this list represents the types of equipment that could be required to complete each phase of demolition (e.g., impact equipment to breakup concrete) as well as the noise levels associated with each phase.

7 Methods, measurements, and calculations are described in Appendix D.

TABLE IV.I-3

TYPICAL DEMOLITION EQUIPMENT NOISE LEVELS

Equipment Type	Measured Noise Level at 50 feet (dBA)[a]
60-ton hydraulic boom crane	77
Haul truck	74
Flat-bed truck	74
Front-end loader	74
Transporter Truck	75 [b]
Large fork lift	76
Back hoe	75
Hoe ram impact hammer	96 [c]
Grader	75
Compaction Roller	74

[a] Measurements by Parsons (2003) on recent rail, highway, and pipeline construction and demolition projects.
[b] Estimated.
[c] This equipment has an impulsive noise characteristic.

SOURCE: Parsons (2003)

demolition described above (i.e., the second stage).[8] The noise level generated was measured at the six receptor locations described earlier and shown in Figure IV.I-1 to account for the acoustical effects of the terrain, building structures, and atmospheric conditions. The resulting noise levels, based on measured noise plus background noise, were then compared to the maximum noise levels set by the Berkeley Noise Ordinance as well as the average measured existing noise levels in each of these areas. These results are shown in **Table IV.I-5**.

As noted earlier, demolition work would be conducted Monday through Friday, with possible infrequent truck loading and departure on Saturdays and/or Sundays. As shown by **Table IV.I.-5**, the noise levels associated with the loudest phase of demolition would not be audible at most adjacent sensitive receptor locations, and would not exceed applicable weekday noise limits set

[8] Noise levels associated with demolition of the foundation and substructure would be 1 dBA louder than the artificial noise source used in this analysis. As mentioned earlier, except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived. Therefore, for this analysis, it was assumed that the noise levels measured as part of the noise tests conducted using the artificial noise source would serve as a reasonable substitute for the noise levels generated by the loudest stage of demolition.

TABLE IV.I-4

NOISE LEVELS WITH SIMULTANEOUS OPERATION OF DEMOLITION EQUIPMENT

Equipment Type	Quantity	Noise Level at 50 feet (dBA)
First Stage: dismantling and removal of the shielding blocks and Bevatron and demolition of the buildings		
60-ton hydraulic boom crane	2	83
Large fork lift	1	
Flat-bed truck	1	
Transporter truck	1	
Front-end loader	1	
Second Stage: demolition of the foundation and substructure		
Hoe ram impact hammer	1	96
Front-end loader	1	
Back hoe	1	
Haul truck	1	
Third Stage: back filling, grading, and compaction		
Back hoe	1	80
Grader	1	
Compaction roller	1	

SOURCE: Parsons (2003)

by the Berkeley Noise Ordinance.[9] Weekend truck loading and departure activities would generate noise levels that would not exceed Berkeley's weekend noise standard at any sensitive receptor sites. At the same time, on-site receptors, such as occupants of LBNL buildings adjacent to the project site, would experience temporary noise increases during demolition. Although such receptors are not generally considered noise-sensitive, as mentioned above, the 1987 LRDP EIR, as amended, recognized that implementation of the 1987 LRDP could create significant adverse noise impacts (Impacts III-K-1 and III-K-2). Implementation of the 1987 LRDP EIR, as amended, mitigation measures described in this section would lessen the impact to a less-than-significant

[9] If demolition work were to occur on weekends, associated noise levels would exceed Berkeley's weekend noise standard at Site 4 and at the wall at Site 6. At Site 4, the combination of background and demolition noise would result in a noise level of up to 57 dBA, which represents an approximately 3-dBA increase over background noise. A 3-dBA change is considered a just-perceivable difference in noise level. Therefore, this increase in noise level would result in a less-than-significant impact. The majority of LHS activities occur away from the wall at Site 6, in areas where there is no line-of-sight to the project area (a partial line-of-sight is available at the wall, as well as at the north parking area). Given that most LHS visitors would remain in the area behind this wall and that LHS itself is well behind this wall, LHS activities and visitors would not be exposed to demolition noise levels in excess of the weekend standard.

TABLE IV.I-5

MEASURED NOISE LEVELS AT SENSITIVE RECEPTOR LOCATIONS WITH DEMOLITION

Measurement Location (See Figure IV.I-1)	Demolition Noise Level at Sensitive Receptor Locations (dBA)	Maximum Allowable Noise Level (Weekday/Weekend) (dBA)	Average Background Noise Level (dBA)
Area 1			
Site 1 (zoned R4)	54	65/55	54
Site 2 (zoned R4)	46	65/55	46
Site 3 (zoned R1)	44	60/50	44
Area 2			
Site 4 (zoned R1)	up to 57	60/50	54
Site 5 (zoned R1)	up to 53	60/50	52
Area 3			
Site 6 (at wall) (zoned R5)	up to 60	65/55	54
Site 6 (15 ft. from wall) (zoned R5)	not audible	65/55	53

SOURCE: Parsons (2003)

level. Moreover, as part of project contract specifications, LBNL would require its subcontractors to employ the following noise control procedures:

- Maximum noise: Contractors will use equipment and methods during the course of this work that minimize disruption to adjacent offices and residences. Noise levels for trenchers, graders, and trucks will not exceed 80 dBA at 50 feet as measured under the noisiest operating conditions.

- Equipment: Contractors will use jack hammers equipped with exhaust mufflers and steel muffling sleeves. Diesel equipment will have exhaust muffled. Air compressors will be of a quiet type such as a “whisperized” compressor.

- Operations: Machines will not be left idling. Electric power will be used in lieu of internal combustion engine power whenever possible. Equipment will be maintained to reduce noise from vibration, faulty mufflers, or other sources.

- Scheduling: Noisy operations will be identified in the project schedule. Such operations will be scheduled so as to minimize their impact on occupied areas and their duration at any given location.

Demolition also has the potential to produce groundborne vibration impacts. Demolition-induced vibration attenuates more or less rapidly at distance from the source, depending largely on soil conditions. Given the distance between the demolition site and any off-site buildings and residences, it is reasonable to assume that there would be no off-site impacts from groundborne vibration regardless of soil conditions. People working in LBNL buildings in the immediate

vicinity of Building 51 may notice groundborne vibrations associated with demolition of the building. This impact would be less than significant because it would be temporary and intermittent and would not adversely affect any off-site receptors.

Lastly, truck traffic associated with the hauling of materials to and from the site could potentially elevate noise levels along haul routes for the duration of demolition activities. As described in Section IV.K, Transportation/Traffic, the project would result in a maximum of 34 daily one-way truck trips. Trucks would be directed to routes on roads and freeways that are already heavily traveled. Therefore, given the limited number of project trips and the volume of existing traffic on the affected roadways, the general increases in noise levels along haul routes would not be perceptible.

Mitigation: None additional required.

Cumulative Impacts

Impact IV.I-2: The project could potentially result in a cumulatively considerable contribution to noise impacts. (Less than Significant)

The project's impacts on ambient noise levels would be intermittent and would be limited to the duration of the project. As described in Impact IV.I-1, the contribution of project demolition noise to the ambient noise environment at the residences nearest to the site would be less than significant.

The 1987 LRDP EIR, as amended, considered the intermittent and short-term effects of equipment and truck noise resulting from the construction of a larger facility than now exists at LBNL. Noise from all project demolition activities would fall well within the total construction noise levels that were considered in that EIR and for which the mitigation measures listed earlier were adopted. Moreover, as is evident from discussion under Impact IV.I-1 regarding the limited effects of project noise on ambient noise at the nearest residences, new development on the UC Berkeley campus and in the city of Berkeley would be too distant and of insufficient noise energy to have a combined adverse effect on ambient noise at these sensitive receptor areas. For these reasons, the project's contribution to cumulative noise impacts from development in the surrounding area, including projects identified in the city of Berkeley and the UC Berkeley campus, would be considered less than significant.

Please refer to the cumulative impacts discussion under Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None additional required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts related to noise. The project would incorporate Mitigation Measures III-K-I and III-K-2 from the 1987 LRDP EIR, as amended.

Building 51 Demolition Project-Specific Mitigation Measures: None required.

References –Noise

California Department of Transportation (Caltrans), Division of Environmental Analysis, Office of Noise, Air Quality, and Hazardous Waste Management, *Transportation Related Earthborne Vibrations (Caltrans Experiences), Technical Advisory, Vibration TAV-02-01-R9601*, February 20, 2002.

City of Berkeley, *Construction Noise Standard – Section 13.40.070, Berkeley Community Noise Ordinance*, available online at http://www.ci.berkeley.ca.us/onlineservice/planning/noiseflyer.pdf, accessed February 8, 2005.

Federal Transit Administration (FTA), U.S. Department of Transportation, *Transit Noise and Vibration Impact Assessment, Final Report*, April 1995.

Parsons, *Noise Study for the Demolition of Building 51 at Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, CA, University of California*, October 2003.

J. Public Services

Introduction

This section discusses existing police and fire protection services at LBNL and the project site and analyzes the potential for the project to adversely affect those public services. The section also addresses potential impacts on public roads.

Setting

Fire Suppression

Fire Protection Services

LBNL secures firefighting services through a contract with the Alameda County Fire Department, which staffs a fire station located on the LBNL grounds. This station, which is Alameda County Station No. 19, is located at LBNL Building 48. Station 19 is staffed with four persons 24 hours a day, every day of the year: two firefighters, one engineer, and one officer. Three of these personnel are required to be trained in hazardous materials response, and one is a paramedic. Equipment at Station 19 includes one fire engine, one reserve fire engine, a hazardous materials vehicle, and a light-duty four-wheel drive "brush patrol unit" that can be used for wildland fires.

Station 19 provides first response at the Berkeley Lab for both fire alarms and medical emergencies. All Station 19 personnel are trained as Emergency Medical Technicians and are certified to operate a defibrillator in cardiac emergencies. The standard arrangement has one defibrillator on the main fire engine and one with the brush patrol unit. There is always one trained paramedic on the fire staff. LBNL provides these fire services to the local community as a complementary and mutually supportive capability to its fire protection needs. The Berkeley Fire Department provides paramedic transport to LBNL; therefore, if a patient in a medical emergency requires transport to a hospital, a City of Berkeley ambulance responds to the Berkeley Lab.

Station 19's service area extends outside the Berkeley Lab boundary to encompass the eastern portion of the UC Berkeley campus and areas in north Berkeley through an automatic aid agreement with the City of Berkeley. Under this agreement, Station 19 automatically responds to all fire and medical emergency calls within its service area, whether on or off the LBNL campus. If the fire engine from Station 19 has been dispatched to a call and another alarm is received in Station 19's service area, the Berkeley Fire Department responds to the second call. The Alameda County Fire Department has mutual aid agreements with other communities, including Oakland and the East Bay Regional Park District, that can be activated in the event of a major emergency. Mutual aid agreements allow Station 19 to respond to emergency calls in other jurisdictions if requested and if Station 19 is not already responding to another call. LBNL maintains its own emergency number as well as "911" service. LBNL's internal emergency number rolls over to the County emergency services dispatcher.

An Emergency Operations Center has been established at LBNL's Station 19, which is equipped with fault-tolerant telecommunications. LBNL's Fire, Medical, Protective Services, Plant Engineering, Maintenance, and Environmental Health and Safety personnel are trained and equipped to respond to local emergencies. Each building, including Building 51, has an Emergency Team headed by the building manager.

Response Times

The response time standard for Station 19 to locations within the Lab is usually less than five minutes. Approximately 25 percent of responses from Station 19 are to locations at the Berkeley Lab; about 40 percent of the calls are to the UC Berkeley campus, and the remaining one-third are to locations within the City of Berkeley outside either LBNL or the Berkeley campus. Between August 2002 and July 2003, Fire Station 19 received 129 calls from LBNL. Of these calls, approximately 21 percent were for medical services, nine percent were for hazardous materials-related incidents, two percent were for fire services, 40 percent were for "other" incidents, and 28 percent were false alarms.

Vegetation Management Plan

LBNL actively manages vegetation over the entire site to minimize damage in the event of a major wildland fire. The Lab's vegetation management program integrates aesthetic, view, horticultural, and fire safety factors. Vegetation, or wildland fire fuel, is managed sitewide to protect the Lab's buildings and workspaces during a worst-case fire driven by Diablo winds (winds similar to those in the 1991 Oakland Hills Fire) and any lesser wildland fire. While a wildland fire may burn in an extreme manner in the areas beyond the Lab's management zone, the lack of fuel within the management zone would reduce fire conditions to acceptable levels on the Lab's site. In the event of a fire at LBNL, on-site vegetation conditions would keep the fire at the level of a low-intensity ground fire, and any ignition or flamefront would not climb into trees and/or produce further firebrands that would advance the fire beyond the Lab.

Police Protection

Police services at LBNL are provided through a contract with the UC Berkeley Police Department (UCPD). UCPD handles all patrol, investigation, and related law enforcement duties for UC Berkeley and associated University-owned properties. LBNL also contracts with a private security firm, which is responsible for on-site security needs including Laboratory access, property protection, and traffic control.

UCPD Services

UCPD operates 24 hours a day, seven days a week, coordinating closely with the City of Berkeley Police Department. UCPD includes 77 police officers, 45 full-time non-sworn personnel, and 60 student employees. Located at 1 Sproul Hall on the UC Berkeley campus, UCPD has primary law enforcement jurisdiction on the campus of the University of California and associated University properties, including LBNL. UCPD is organized into four divisions:

Administration, Community Outreach and Emergency Services, Investigative and Support Services, and Patrol.

UCPD is empowered as a full-service state law enforcement agency pursuant to Section 830.2(b) of the California Penal Code and fully subscribes to the standards of the California Commission on Peace Officer Standards and Training. Officers receive the same basic training as city and county peace officers throughout the state, plus additional training to meet the unique needs of a campus environment.

On-Site Security Services

The on-site security staff at LBNL totals approximately 25 personnel, divided into five to six personnel per shift. Staffing and resources include an on-site manager, two roving patrols 24 hours per day, and gate access attendants 24 hours per day at the Blackberry Gate and fewer hours at the Strawberry and Grizzly Peak gates.

Response Times

LBNL on-site security staff can respond to any accessible area of LBNL in less than five minutes. UCPD responds to LBNL as needed under the existing contract. The response time for UCPD is also less than five minutes. Generally, there are fewer than 10 calls annually from LBNL that require UCPD response, and most of the calls are for routine events. There have been no calls involving homicide, rape, assault, or robbery.

Road Maintenance Services

The City of Berkeley Public Works Department maintains public streets within the city limits of Berkeley. Caltrans maintains public highways in the project site vicinity.

Regulatory Environment

LBNL Long Range Development Plan (LRDP)

Development programs have been identified in the 1987 Long Range Development Plan to accommodate growth at LBNL. One of the principal programs is directed toward fire safety coordination. The fire safety measures "include participation in preventive burn programs and control of vegetation on LB[N]L land…"

LBNL Master Emergency Plan and Building Emergency Plans

LBNL's Master Emergency Plan describes how the Laboratory's resources are organized to respond to disasters such as a significant fire or earthquake. In addition, each building has a Building Emergency Plan that describes specific actions and responsibilities for employees assigned to building emergency teams.

Impacts and Mitigation Measures

Significance Criteria

The impact of the project on public services would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the state CEQA Guidelines and the UC CEQA Handbook:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response time or other performance objectives for any of the following public services:
  - Fire protection;
  - Police protection;
  - Schools;
  - Parks; or
  - Public roads; or
- Exceed an applicable LRDP or Program EIR standard of significance.

The Initial Study (see Appendix A) found that the project would not have any impacts on schools, parks, or other public facilities. This EIR therefore does not discuss these issues further.

Measures Included as Part of the Project

As more fully described in the 1987 LRDP EIR, as amended, potential adverse impacts on public services could result from the University's continued operation of LBNL, including the increased population at LBNL that is projected to occur due to continued implementation of the 1987 LRDP EIR, as amended. The following impacts on public services have been anticipated and analyzed pursuant to CEQA as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered:

Impact III-L-1:	The construction of additional facilities and any increased population would not cause increased impacts on local police and fire protection services.
Cumulative Impacts:	No significant cumulative impacts upon public services at and in the vicinity of LBNL are anticipated.

The 1987 LRDP EIR, as amended, does not contain public service mitigation measures that would be applicable to the proposed project. All potential impacts were found to be less than significant without mitigation.

Impacts

Impact IV.J-1: Demolition activities could temporarily affect fire and police response times. (Less than Significant)

The proposed project would not introduce any additional long-term population or employment into the area. Thus, it would not result in any additional long-term demand for police or fire services or the need for new or altered facilities.

The proposed demolition activities may require temporary roadway lane closures and detours, but these temporary changes would not significantly affect response times to the project site and its vicinity. No complete road closures are anticipated during the demolition period. Demolition activities would be overseen so as to comply with applicable safety requirements, including but not limited to LBNL-specific requirements and those of the U.S. Department of Energy and the federal Occupational Safety and Health Administration. Fire, emergency medical, and police services would be appropriately informed of relevant aspects of the project.

Mitigation: None required.

Impact IV.J-2: Project demolition truck trips would cause wear and tear on public roads and highways. (Less than Significant)

Heavy trucks, including flat-bed and soil-haul trucks, are commonly used in most construction/demolition projects and would be used by the project. The proposed demolition would result in a maximum of approximately 34 one-way truck trips per day, and 4,700 total one-way truck trips on Berkeley city streets and public highways over a period of four to seven years. These project-related truck trips, along with other, non-project-related truck trips, would cause wear on those streets, roads, and highways. Large trucks are used routinely on local streets designated as truck routes within Berkeley and also used on public highways and freeways. Such public roadways are designed and constructed to sustain regular use by heavy trucks. While most of the project truck shipments are anticipated to fall within the normal truck weight limits, about five percent would be overweight, and therefore their routes would be specified to preclude damage to bridges along the way. As described in Section IV.K, Transportation/Traffic, all project-related trucks would use approved truck routes, and therefore no damage to roadways is expected beyond that which would be considered normal wear and tear.

Mitigation: None required.

Cumulative Impacts

Impact IV.J-3: The proposed project, together with existing and anticipated future development at LBNL and in the surrounding area, could result in a cumulative increase in demand for police and fire protection services. (Less than Significant)

LBNL maintains its own primary public services (fire protection, security, health and safety). While the proposed project would employ workers for demolition activities, it would not result in any permanent new on-site employees. The approximately 50 people who now work at Building 51 would be relocated to other LBNL facilities, and would not add to future demand for public services. Any temporary increase in public services demand that would result from the demolition activities would be well within levels anticipated and accommodated in the existing LRDP and 1987 LRDP EIR, as amended. Although projected City of Berkeley and UC Berkeley campus projects would be expected to gradually increase demand for off-site services over time, the proposed project-related demand for off-site services would be negligible and temporary, so the project's contribution to a cumulative public services impact would be less than significant.

Please refer to the cumulative impacts discussion in Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts related to public services.

Building 51 Demolition Project-Specific Mitigation Measures: None required.

References –Public Services

University of California Police Department (UCPD), http://police.berkeley.edu/aboutucpd.html, accessed April 13, 2005.

K. Transportation/Traffic

Introduction

This section discusses existing transportation/traffic conditions in the project area and analyzes the potential for the project to affect those conditions, focusing on traffic flow on roadways external to LBNL that serve the project site.

Setting

Roadway Network

Figure IV.K-1 depicts the overall roadway system that serves the project area. LBNL is located close to two major highways: Interstate 80/580 (I-80/I-580) approximately three miles to the west, and State Route (SR) 24 approximately two miles to the south. Access from the Lab to I-80/I-580 is through the city of Berkeley via east-west arterial streets. Access to SR 24 is via Tunnel Road. The primary local access routes to the Berkeley Lab site are University Avenue-Hearst Avenue, Grizzly Peak Boulevard-Centennial Drive, and Piedmont Avenue-Gayley Road.

Highways

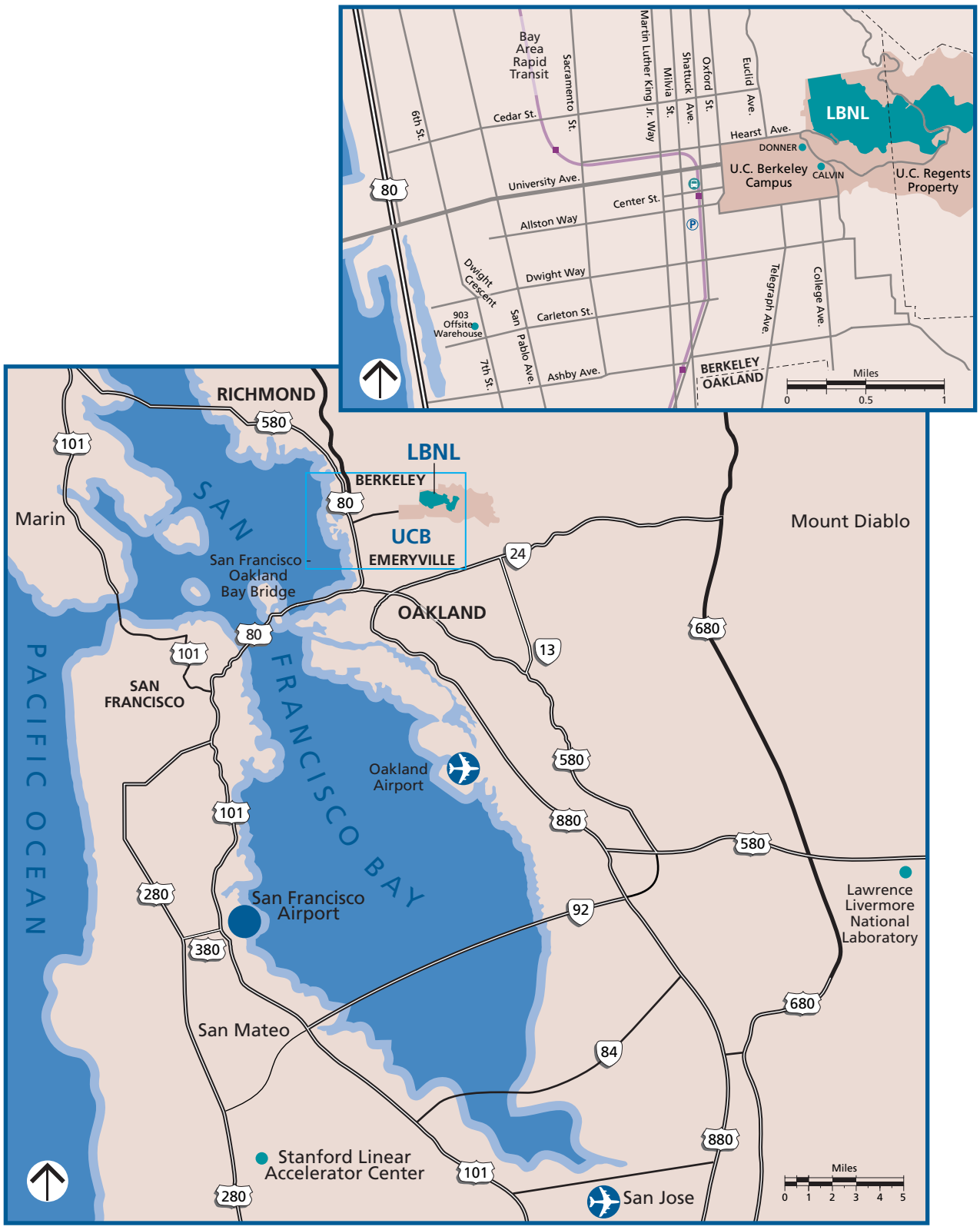
Interstate 80 (I-80) connects the San Francisco Bay Area with the Sacramento region. Within Berkeley, I-80 runs along the western edge of the city in a north-south direction and provides five lanes of travel in each direction. Access from I-80 to the city of Berkeley is provided through interchanges at Ashby Avenue, University Avenue, and Gilman Street.

State Route 24 (SR 24) links I-680 in Contra Costa County to I-80/I-580 and I-980. SR 24 provides four travel lanes in each direction in the Berkeley vicinity. The primary access routes from SR 24 to the Berkeley Lab area are SR 13 (Ashby Avenue) to the Belrose-Derby-Warring corridor, and Telegraph Avenue. Grizzly Peak Boulevard, which runs through a largely undeveloped area to SR 24 via Fish Ranch Road, provides another, less-used access route.

State Route 13 / Ashby Avenue (SR 13) runs from I-580 in east Oakland to I-80, with a partial access interchange at SR 24. In Berkeley, SR 13 is Tunnel Road/Ashby Avenue, a two-lane arterial (almost all the way) running east-west through the city. Ashby Avenue intersects all of the major north-south roadways in Berkeley, providing several routes toward the UC Berkeley campus and LBNL.

Local Streets

University Avenue provides one of the city's three connections to I-80 to the west (along with Gilman Street and Ashby Avenue). The divided four-lane roadway has a center median, left-turn pockets at major intersections, and parallel parking permitted on both sides of the roadway. The



SOURCE: LBNL (2003)

Demolition of Building 51 and the Bevatron / 204442 ■

Figure IV.K-1
Roadway Network

City of Berkeley has designated University Avenue between I-80 and Oxford Street as a truck route.[1]

Hearst Avenue is a two- to four-lane street with on-street parking that extends between west Berkeley and the UC Berkeley campus. During peak commute hours (generally from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.), parking restrictions (between Gayley Road and Oxford Street) on the south side of the street in the morning and on the north side of the street in the evening provide an additional travel lane.

Oxford Street is a two- to four-lane street that runs between downtown Berkeley to the south and Marin Avenue to the north, and that connects University Avenue and Hearst Avenue. Parking is allowed on both sides of the street.

Shattuck Avenue is a four-lane street in the project vicinity, with a center raised median, left-turn pockets, and on-street parking. Shattuck Avenue is a designated truck route.

Centennial Drive rounds the east and south perimeters of LBNL, connecting Grizzly Peak Boulevard and Stadium Rim Way. It provides access to the Lab site through two gates: Strawberry Canyon Gate and Grizzly Peak Gate. It is also a main road access to the Lawrence Hall of Science, the Botanical Garden, Strawberry Canyon Recreational Area, and Tilden Regional Park. Several sections of the roadway have steep climbs; sharp curves are present near LBNL where the speed limit drops to 15 miles per hour (mph).

Grizzly Peak Boulevard is a two-lane, two-way roadway located in the hills of Berkeley. Its narrow and curvy roadway provides little or no pedestrian or bicyclist amenities south of Centennial Drive, but provides access to the trails into Tilden Regional Park, as well as to SR 24. North of the intersection with Centennial Drive, Grizzly Peak Boulevard travels in the hillside residential neighborhoods of north Berkeley.

Gayley Road is a two-lane street that borders the east side of the UC Berkeley campus. On-street parking is not allowed south of Hearst Avenue until the vicinity of Memorial Stadium, where Gayley Road becomes Piedmont Avenue.

Stadium Rim Way wraps around the east and north sides of Memorial Stadium and connects Gayley Road and Centennial Drive, thus providing access to Grizzly Peak Boulevard (described above). On-street parking on Stadium Rim Way is designated as a parking lot by UC Berkeley, primarily on the east and north sides of the road; sidewalks and metal poles separate pedestrian and vehicle traffic.

[1] Berkeley Municipal Code Section 14.56.060 states as follows: "The City [of Berkeley] establishes a designated commercial truck route system requiring such vehicles exceeding seven tons gross vehicle weight to use the following streets or portions of streets within the City of Berkeley except when taking the shortest possible route between the truck route system and the point of origin or destination in the City of Berkeley...". As described elsewhere in this EIR, as a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible.

On-Site Gates and Roads

Vehicles can enter Berkeley Lab through three gates: Blackberry (main) Gate, Strawberry Gate, or Grizzly Peak Gate. Normally, Blackberry Gate is staffed continuously, Strawberry Gate is staffed for about 13 hours encompassing both the morning and evening commute hours, and Grizzly Peak Gate is staffed during morning commute hours only.

The Laboratory's main vehicle routes are two-way, except for three sections where roadside parking reduces traffic lanes, permitting only one-way travel. Main routes within the boundaries of LBNL include *Cyclotron Road* and *Lawrence Road*. Vehicle access to the project site is from Lawrence Road. Cyclotron Road and Lawrence Road each have two lanes, and on-street parking is prohibited. As part of its standard practices, the Laboratory uses or requires subcontractors to use advance warning signs and flaggers to direct traffic as needed to maintain safe and efficient traffic flow during construction projects.

Existing Transit and Shuttle Services

The Berkeley Lab site is served indirectly by Bay Area Rapid Transit (BART) and by Alameda–Contra Costa Transit (AC Transit) bus routes, and directly by two LBNL-operated shuttle service routes.

BART and AC Transit Services

BART service operates every day of the week, every 15 minutes all day on both the Richmond-Daly City and Richmond-Fremont lines (which serves the downtown Berkeley BART station) in both directions, and every five to 10 minutes during peak hours (every 15 minutes midday) on the Pittsburg/Bay Point line (which serves the Rockridge BART Station). AC Transit, with 11 lines serving the UC Berkeley campus area, provides travel to and from neighboring cities including Oakland, Richmond, El Cerrito, San Francisco, and local Berkeley neighborhoods. None of these routes serves LBNL directly, but LBNL shuttles provide connections to BART stations and AC Transit stops.

LBNL Shuttle Services

LBNL operates an on-site shuttle bus and several shuttle buses that travel off-site. Two of the latter travel around some of the perimeter of the UC Berkeley campus, and one shuttle goes to downtown Berkeley, connecting with the Berkeley BART Station and AC Transit bus lines. A separate off-site shuttle provides express service to and from the Rockridge BART Station at selected commute hours. Shuttles are free. Employees and passengers engaging in official Laboratory business, including contractor personnel, are permitted to use the off-site LBNL shuttle services. Off-site shuttle service starts at 6:20 a.m. from the main Laboratory shuttle bus hub located at Building 65 and continues until 6:50 p.m. Buses run every 10 minutes up to 6:10 p.m. Between the hours of 6:10 p.m. and 6:50 p.m., the shuttle runs at 20-minute intervals. The internal shuttle operates every 10 minutes from 6:40 a.m. until 5:20 p.m.; it then operates at 20-minute intervals until 6:50 p.m. The closest internal shuttle bus stop to the project site is below Building 70, across the street from the entrance to Building 51.

Traffic Operating Conditions

The UC Berkeley 2020 LRDP EIR assessed existing traffic level of service (LOS) conditions during weekday a.m. and p.m. peak traffic hours at the following intersections (UC Berkeley, 2004):

- Hearst Avenue and La Loma Avenue / Gayley Road – signalized
- Hearst Avenue and LeRoy Avenue – side-street stop-sign control
- Hearst Avenue and Euclid Avenue – signalized
- Hearst Avenue and Scenic Avenue – side-street stop-sign control
- Hearst Avenue and LeConte Avenue – side-street stop-sign control
- Hearst Avenue and Spruce Street – signalized
- Hearst Avenue and Oxford Street – signalized
- Hearst Avenue and Shattuck Avenue – signalized
- Oxford Street and Berkeley Way – signalized
- Oxford Street and University Avenue – signalized
- University Avenue and Shattuck Avenue (northbound) – signalized
- University Avenue and Shattuck Avenue (southbound) – signalized
- University Avenue and Milvia Street – signalized
- University Avenue and Martin Luther King, Jr. Way – signalized
- University Avenue and San Pablo Avenue – signalized
- University Avenue and Sixth Street – signalized
- Shattuck Avenue and Bancroft Avenue – signalized
- Shattuck Avenue and Durant Avenue – signalized
- Gayley Road and East Gate – side-street stop-sign control
- Gayley Road and Stadium Rim Way – all-way stop-sign control
- Stadium Rim Way and Centennial Drive – all-way stop-sign control
- Centennial Drive and Grizzly Peak Road – all-way stop-sign control

The LOS concept is a qualitative characterization of traffic conditions associated with varying levels of traffic, based on delay and congestion. Descriptions of conditions range from LOS A (free-flow condition) to LOS F (jammed condition). LOS C or better are generally considered to be satisfactory service levels, while LOS D is minimally acceptable, LOS E is undesirable, and LOS F conditions are unacceptable. The determination of LOS for signalized and all-way stop-sign-controlled intersections is based on the average delay (in seconds per vehicle) for the entire intersection. The LOS for intersections controlled by stop signs on side-street approaches only is presented for the worst movement at the intersection (i.e., the movement with the highest average delay in seconds per vehicle) that is controlled by stop signs.

Traffic counts were conducted at each of the above-cited intersections when UC Berkeley was in session.[2] Based on methodologies presented in the 2000 *Highway Capacity Manual*, all of these intersections operate at an acceptable LOS D or better during both the a.m. and p.m. peak hours,

[2] Peak-period traffic counts were conducted at the study intersections during November and December 2002 for the UC Berkeley LRDP Update analysis.

except for the signalized intersections of University Avenue / Sixth Street and University Avenue / San Pablo Avenue, which operate at LOS F during both peak hours.[3]

The Alameda County Congestion Management Agency's 2002 level of service monitoring indicates that the segments of I-80 through Berkeley are congested (LOS E or F) in both directions during morning and afternoon peak commute periods, and frequently during off-peak periods as well (Abrams Associates, 2002). The portion of SR 24 within the Oakland city limits experiences LOS F in the eastbound direction from I-580 to the Caldecott Tunnel during the p.m. peak hour. The only Alameda County Congestion Management Program (CMP) arterial roadway operating at LOS F within the city of Berkeley is SR 13 (Ashby Avenue).

Regulatory Environment

1987 LBNL Long Range Development Plan (LRDP)

The 1987 LRDP Development Plan Elements address a general framework for transportation, providing for continued operation of on-site and off-site buses to minimize traffic and optimize access to facilities, and for van- and car-pool incentives to be maintained.

City of Berkeley General Plan

As a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible. The Transportation Element of the City of Berkeley General Plan policies that potentially pertain to the proposed project include:

- Policy T-2 Public Transportation Improvements: Encourage regional and local efforts to maintain and enhance public transportation services and seek additional regional funding for public and alternative transportation improvements.

- Policy T-18 Level of Service: When considering transportation impacts under the California Environmental Quality Act, the City shall consider how a plan or project affects all modes of transportation, including transit riders, bicyclists, pedestrians, and motorists, to determine the transportation impacts of a plan or project. Significant beneficial pedestrian, bicycle, or transit impacts, or significant beneficial impacts on air quality, noise, visual quality, or safety in residential areas, may offset or mitigate a significant adverse impact on vehicle Level of Service to a level of insignificance. The number of transit riders, pedestrians, and bicyclists potentially affected will be considered when evaluating a degradation of LOS for motorists.

- Policy T-23 Truck Routes and Truck Traffic: To the greatest extent possible, protect residential streets from hazardous or heavy traffic. (City of Berkeley, 2001)

[3] The *Highway Capacity Manual* is published by the Transportation Research Board. Characterization of existing levels of service is taken from the *UC Berkeley LRDP Final EIR* (April 2004).

Impacts and Mitigation Measures

Significance Criteria

The impact of the proposed project on transportation would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the CEQA Guidelines and the UC CEQA Handbook:

- Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections), as follows:
  - Cause levels of service at an intersection to degrade below LOS D, based on total intersection delay (2000 *Highway Capacity Manual* methodology); or
  - Cause a significant incremental decline in service at an intersection currently operating at LOS E or worse (defined for purposes of analysis as an increase in total traffic volume of greater than five percent[4] or more, relative to the No Project volume);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for its biennial monitoring of CMP-designated roads or highways, as follows:
  - On CMP-designated roadway segments that are projected to meet the CMP standard in the future without the project (2025), the impact is significant if the project would cause the segment to exceed the standard and adds at least five percent to the future peak hour volume, or;
  - On CMP-designated roadway segments that are projected to exceed the CMP standard in the future without the project (2025), the impact is significant if the project would add at least five percent to the future peak hour volume.
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses;
- Create unsafe conditions for pedestrians or bicycles;
- Result in inadequate emergency access;
- Result in inadequate parking capacity;
- Conflict with applicable policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks); or

[4] The five-percent threshold is based on the fact that day-to-day traffic volumes can fluctuate by as much as 10 percent, and therefore a variation of five percent is unlikely to be perceptible to the average motorist.

- Exceed an applicable LRDP or Program EIR standard of significance.

As indicated in the Initial Study (see Appendix A), the proposed project would not alter existing air traffic patterns, and since it would not involve any changes to roadway design features, it would not increase hazards related to such features. This EIR therefore does not address these issues further.

Measures Included as Part of the Project

Transportation impacts were analyzed and mitigation measures were adopted as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered. However, those analyses focused on incremental increases in traffic volumes and parking demand due to projected increases in the number of employees and visitors at LBNL, and mitigation measures focused on the use of Transportation System Management programs (e.g., ridesharing and LBNL shuttle service) to reduce the number of vehicles traveling to, and parking at, LBNL. Those impacts and mitigation measures are less applicable to the proposed Building 51 and Bevatron demolition project, which involves temporary demolition-related impacts rather than long-term operational impacts.

LBNL's Facilities Master Specifications (Environment, Safety, and Health General Requirements) require subcontractors to furnish an adequate number of flaggers for all work that may affect the use of roads by the University. The following standards are required for traffic flaggers:

- Flaggers shall be posted at the entrance and exit of access roads used for hauling material and at all other areas where normal traffic is subject to disruption.

- Flaggers shall be equipped and instructed at Subcontractor's expense in accordance with current "Instructions to Flaggers" of the Department of Transportation, State of California.

Additionally, LBNL's Health and Safety Manual states that "[t]raffic disruptions and road closures should be managed to prevent vehicle accidents and protect property. Signs, cones, barricades, flaggers, and clearly identified traffic detours must be employed to ensure smooth and safe flow of traffic. Security and the Fire Department must be notified of road closures" (LBNL, 2004).

Impacts

Impact Assessment Methodology

Direct impacts of the proposed project would not be long-term, ongoing effects, as would be expected from a conventional development project that, in addition to construction impacts, would be operational at relatively constant levels of activity for 20 years or more. In contrast, the proposed project is assumed to take place over a four- to seven-year period and the level of activity would vary by phase and by tasks undertaken. Thus, the project's potentially significant impacts would involve short-term disruption of traffic flow and increased congestion generated

by project vehicles, and would be limited to the period of time needed to complete the various project components. Therefore, LBNL-designated measures identified in this EIR focus on reducing potential short-term effects of the demolition project; long-term mitigation measures are not needed.

Estimates of total project-generated demolition truck traffic were based on the anticipated quantities of various demolition and backfill materials and the capacity of trucks that would haul those materials. That total number of trucks was then spread over the various phases of the work (e.g., disconnecting utilities, removing blocks that shielded the accelerator, disassembling the Bevatron, and demolishing the Building 51 structure, foundation, and components, followed by backfilling and hydroseeding the site) that would occur for different time periods. The effects of the resulting estimated truck trips per day were then assessed, and are discussed below.

Impact IV.K-1: The proposed project, including demolition and earthmoving activities such as excavation, backfill, and grading, would temporarily and intermittently increase traffic volumes on roadways used by demolition-related vehicles. (Less than Significant with Mitigation)

The project would result in temporary and intermittent increases in traffic volumes on area roadways. Those increases would be associated with commute trips by demolition workers and the movement of equipment used for demolishing the Building 51 and the Bevatron, removing materials, and backfilling and grading the project site. The intensity and nature of these activities would vary over the multi-year period of the project, and the range of adverse impacts on traffic flow and parking conditions would similarly vary. Potential adverse project-related transportation impacts would primarily relate to temporary increases in traffic volumes on area roadways outside the Lab site, in the City of Berkeley.

Truck Destinations and Routes

The project would generate truck trips for a variety of purposes, including equipment and material deliveries and removals, demolition, excavation, and backfilling. The project would seek to reuse or recycle materials (e.g., uncontaminated metals and concrete) where feasible. For example, uncontaminated metals might go to scrap dealers. Items that could not be salvaged would be sent to appropriate municipal landfills, such as the Altamont Landfill in Livermore, California. Items showing detectable radioactivity would be sent to an approved disposal site, such as Envirocare in Clive, Utah (a licensed privately operated facility), or the Nevada Test Site (a DOE facility approximately 65 miles from Las Vegas). Items contaminated with non-radioactive hazardous materials would be sent to treatment and disposal facilities or landfills permitted to receive such items.

Berkeley Laboratory routinely informs its construction subcontractors that truck routing be directed toward University Avenue, Oxford Street between Hearst and University Avenues, Hearst east of Shattuck Avenue, Shattuck Avenue, Adeline Street, and Ashby Avenue, and that trucks avoid the Warring/Derby/Belrose/Claremont corridor. As part of the proposed project, truck shipments would follow a subset of these routes: in general, shipments from the site would

proceed down Cyclotron Road to Hearst Avenue and then proceed west on Hearst Avenue, south on Oxford Street, and west on University Avenue to I-80. Shipments to the site would reverse these directions. This is also the route designated for radioactive and mixed waste in a 1996 agreement between LBNL and the City of Berkeley (see discussion under Impact IV.K-4, below). The location of the receiving facilities would dictate what direction on I-80 the trucks would travel.

No roads would be permanently closed as a result of the action, and no new roads, road extensions, or improvements would be required. As stated above, LBNL's Facilities Master Specifications would require flaggers for all work that may affect the use of roads by the University and, in accordance with LBNL's Health and Safety Manual, traffic disruptions and temporary road closures would be managed through the use of signs, cones, barricades, flaggers, and clearly identified traffic detours. Additionally, security and the local fire and police departments would be notified of any temporary road closures.

Number and Timing of Trips

An estimated maximum of about 4,700 one-way truck trips would be required over the four- to seven-year term of the project. Most of the trips would be one of two types: 1) inbound trips with empty trucks and outbound trips with trucks hauling away material for appropriate disposal, or 2) inbound trips delivering clean backfill and outbound empty trucks. Other trips would be for the delivery of project-related demolition equipment and miscellaneous supplies.

Demolition work would be performed approximately 40 hours per week, Monday through Friday; normal work hours would be between 7:00 a.m. and 3:30 p.m.. It is possible that some work, including truck loading and departure, would take place on Saturdays and/or Sundays, although this would be infrequent.

The highest level of truck travel would occur during the final months of the project, when backfilling is underway. It is estimated that the number of daily truck trips at that time would be about 18 to 34 one-way trips (i.e., up to 17 loaded trucks and 17 empty trucks); during the other periods of demolition activity, the number of truck trips per day would be no more than about 10 one-way trips.[5] Because these truck trips would be spread over the course of a work day, the up to 34 daily one-way trips would generate an average of about four one-way trips per hour (i.e., one truck every 15 minutes). However, the actual number of shipments could be greater at particular times.

The workforce for the project would generate auto commute trips. The number of workers and associated trips would vary over the multi-year demolition period, but is estimated to be about 20 to 25 workers on average per day, with a maximum of up to about 50 workers. Contractor personnel not taking public transportation or LBNL-provided bus transit would park near the project site or elsewhere at LBNL. An estimate of the number of daily trips by workers is based upon a conservative assumption that all of the workers would be driving alone (i.e., no carpooling assumed) to and from the site during the peak hour, even though public transportation and

[5] For comparison, existing daily traffic entering and exiting LBNL is approximately 5,700 vehicles per weekday.

Laboratory shuttles are available in the project area. In addition, it was assumed that because of the presence of an on-site cafeteria, no more than about 25 percent of the demolition workers would travel off-site during the lunch period. The number of trips generated by workers would therefore be up to 50 inbound trips in the morning, 24 mid-day trips (12 inbound, 12 outbound), and 50 outbound afternoon trips for a total of approximately 124 daily trips during the peak demolition activity periods. The worker-generated trips would be dispersed over the various roadways used between the project site and the worker's trip origin/destination. The impact would be less than significant because even if the commute and mid-day trips were all made on University Avenue, the increase in traffic volumes at the congested University Avenue / San Pablo Avenue and University Avenue / Sixth Street intersections would be less than the five-percent threshold of significance

Effects on Roads and Intersections

Demolition-generated traffic would be temporary and therefore would not result in long-term degradation in operating conditions on area roadways or at area intersections. The estimated increase in traffic volumes caused by project-generated haul truck traffic would not be substantial relative to background traffic conditions, and would fall within the daily fluctuations of traffic volumes for area roadways, which would not be noticeable to the average motorist. As noted above, the intersections of University Avenue / Sixth Street and University Avenue / San Pablo Avenue operate at LOS F during both peak hours. The remaining 20 study intersections operate at LOS D or better. The project's contribution to the two intersections operating at LOS F would represent an increase of no more than about 0.9 percent above the a.m. and p.m. peak hour traffic volumes. These truck trips would be spread over the course of a work day, therefore, the highest level of truck traffic would generate an average of about one truck every 15 minutes. Therefore, this short-term increase in vehicle trips would not significantly affect level of service and traffic flow on roadways. The primary impacts from demolition truck traffic would include a temporary and intermittent reduction of roadway capacities due to the slower movements compared to passenger vehicles. As stated above, at particular times, the actual number of truck trips could be greater than the average estimated herein. However, with the adoption of the mitigation measure described below, the number of demolition-generated vehicle trips would not result in any adverse change in traffic levels of service.

Level of service standards for roadways that are part of the CMP network are intended to regulate long-term traffic increases from operation of new development, and do not apply to temporary construction or demolition projects, such as the proposed project. The proposed project therefore would not exceed level of service standards established by the Alameda County Congestion Management Agency for designated CMP roadways.

The project would neither alter the physical configuration of the existing roadway network serving the area, nor introduce unsafe design features. The physical and traffic characteristics of area roadways (e.g., traffic signal and stop-sign control, pedestrian crosswalks and crossing signals) would safely accommodate project-generated traffic. The project's effect on general and emergency access, pedestrians and bicyclists, and safety related to roadway design, would be less than significant.

Transportation of equipment or demolition materials exceeding the load size and weight limits of any roadways would require special permits. There are established procedures and processes for obtaining such permits through agencies governing the use of the roadway and highway system. Compliance with applicable regulatory requirements is expected to result in less-than-significant impacts.

Mitigation: To address potential temporary and intermittent adverse effects to transportation and traffic, the following mitigation measure would be adopted:

> **Mitigation Measure IV.K-1:** The frequency of truck trips (loaded or empty) shall be no greater than (a) one every 10 minutes (six truck trips per hour) during the a.m. and p.m. peak commute hours, and (b) one every five minutes (12 truck trips per hour) during periods other than the a.m. and p.m. peak commute hours.
>
> Under this limitation, the projected level of truck traffic would have minimal and less-than-significant effects on traffic flow, even if those trucks were to travel through the congested intersections on University Avenue at San Pablo Avenue and Sixth Street during the peak commute hours. Project-generated hourly truck trips would represent an increase of no more than about 0.9 percent above the a.m. and p.m. peak-hour traffic volumes, respectively, at the above-cited congested intersections.[6]

Significance after Mitigation: Less than Significant

Impact IV.K-2: Demolition workers would use the Building 51 staging area for parking. (Less than Significant)

Demolition workers would require parking areas for their vehicles. Adequate parking is available in the Building 51 staging area to meet project-related parking needs, and as part of the proposed project, demolition workers driving vehicles to LBNL would be directed to park within that area. This impact would thus be less than significant.

Mitigation: None required.

Impact IV.K-3: The project could potentially affect transit service in the project area. (Less than Significant)

[6] The maximum 0.9-percent increase was calculated using six one-way truck trips (one every 10 minutes), a passenger-car-equivalence of three cars per one truck, and existing a.m. peak-hour traffic volumes on University Avenue. The percent increase with any other combination of values (e.g., four one-way truck trips, or existing p.m. peak-hour volumes, or total intersection volumes, or cumulative volumes) would be less than 0.9 percent.

As described under Impact K.1, above, the project would generate a short-term increase in traffic volumes on area roadways that would fall within the daily fluctuation of traffic and would not be noticeable to the average motorist. The effect on traffic flow (including transit buses) would be less than significant. In addition, as part of the project, LBNL would require contractors to use flaggers as needed to maintain smooth flow of traffic (including LBNL shuttle buses) on Lawrence Road past the project site.

As noted above, the project would employ 20 to 25 workers on average per day, with a maximum of up to about 50 workers. Even if all of these workers took public transit (BART or AC Transit and LBNL shuttle buses) to and from the site, the effect on transit service would be minimal.

The project would not have a long-term, ongoing impact on demand for alternative transportation or on alternative transportation facilities, and thus would not conflict with adopted policies, plans, or programs supporting alternative transportation. The intent of plans and policies described under Regulatory Environment, above, is to guide development and review of proposed projects that could have a long-term, ongoing effect on the transportation environment, and while those plans and policies were reviewed for this EIR, they have limited applicability to the proposed demolition project's temporary effects.

Mitigation: None required.

Impact IV.K-4: The project would generate truck trips carrying hazardous materials, potentially affecting safety. (Less than Significant)

As described in Section IV.F, Hazards and Hazardous Materials, hazardous waste, low-level radioactive waste, and mixed waste would require shipment off-site as a result of the project. Transport of hazardous and radioactive materials is addressed below, and additional information on the handling of these materials is provided in Section IV.F.

Transport of Radioactive Waste

Radioactive waste would consist of waste that contains induced and/or surface radioactivity, the presence of which would be determined by instrument surveys or swipe samples, depending on the items involved. While Berkeley Lab is subject to DOE requirements for the on-site management of radioactive waste, it is subject to a different set of requirements for the transport of such waste, mandated by the U.S. Department of Transportation (DOT), as follows:

- As described in Section IV.F, for volume contamination from induced radioactivity, the DOE-approved detection limit for radioactivity is 2 picoCuries/gram (pCi/g). The DOT definition of radioactive waste differs from that of DOE. Items with induced activity are not managed under DOT regulations as radioactive where the sum of the radioactivity of all of the isotopes expected to be encountered during this project is 270 pCi/g or less. Thus, items with radioactivity between 2 pCi/g and 270 pCi/g would be classified as "radioactive" by

DOE, but not by DOT. Only items with an induced activity above DOT isotope-specific activity thresholds are required to be managed as a DOT hazardous material for shipment to a disposal facility.

- The number of surface contaminated items is expected to be small enough that one shipment would suffice. It is possible that these items would be grouped and shipped with other radioactive waste produced by other programs at LBNL. Shipments would be labeled and transported in accordance with DOT requirements.

- All or most of the concrete blocks containing uranium above background levels, and all of the depleted uranium blocks, would be transported as DOT radioactive material, and labeled and transported in accordance with DOT requirements. Some metals from the Bevatron may also be shipped as DOT radioactive material.

As stated in a 1996 agreement between LBNL and the City of Berkeley, the Laboratory:

> "will target shipments [of radioactive and mixed waste] for the morning hours of 9 a.m. - 11 a.m. and pledge[s] to avoid where possible, shipments during peak 'rush hour' traffic (6 a.m. - 9 a.m. and 3 p.m. - 8 p.m.). However, we must state that when this target cannot be met, the Laboratory reserves the right to allow the transporter to depart at other times, confident that the standard we meet for packaging and shipping such waste provides every reasonable assurance for protection of the environment and public health."

As described earlier, radioactive waste would be sent to an approved disposal site. Prior to beginning shipments of items determined to be radioactive waste, LBNL would make a voluntary annual advance notification to designated City of Berkeley agencies. This notification would summarize the general types of waste being shipped, the typical radioisotope content of each waste type, and the anticipated shipping frequency.

Employees and contractors at Berkeley Lab who handle and transport radioactive materials must comply with the requirements of the Laboratory's DOE-approved Radiation Protection Program. Any shipments or transfers of radioactive materials from the Laboratory would be reviewed and approved by the Environment, Health and Safety (EH&S) Division to ensure that the materials would be properly contained for shipment pursuant to applicable DOT and DOE regulations and requirements, and would not present a hazard to the public during transport. As described in Section IV.F, any radiological dose to LBNL employees and contractors, or to the general public, would be far below applicable regulatory limits.

Transport of Hazardous Waste

The EH&S Division is responsible for ensuring compliance with hazardous waste regulations and for determining the Berkeley Lab Hazardous Waste Handling Facility's management requirements, selecting a disposal site, and manifesting and maintaining disposal records. Hazardous waste, and transite and other asbestos-containing material, would be packaged, labeled, and transported as per EPA and DOT regulatory requirements. Any residual soil or groundwater contamination that is encountered during demolition would be managed in

accordance with applicable DOE and Berkeley Lab policies, and state and federal regulations regarding hazardous waste transport. These regulations are specifically designed to reduce the potential risk of any adverse affects to human health to less than significant levels.

Additional information about the handling of hazardous and radioactive materials is addressed in Section IV.F of this EIR.

Transport of DOT Non-Regulated Materials

In general, due to the absence of hazardous characteristics, the DOT non-regulated materials that would be shipped off-site as a result of the project would not require sealed containers. Items would have been vacuumed or otherwise cleaned prior to shipment, and the trucks would not release radioactive or hazardous dust products. However, some items likely would be shipped in sealed containers because of certain physical characteristics (e.g., small items that otherwise would be difficult to hold down or surface contaminated objects that may contain dispersible radioactivity).

Accident Potential

Accident data for collisions involving trucks over a three-year period (2002 through 2004) were obtained from the Department of California Highway Patrol for roadways that project-generated truck trips would likely use between the project site and the I-80 freeway (CHP, 2005). **Table IV.K-1** shows the name of the road, the length of the road segment in question, the total number of collisions involving trucks in the three-year period, the average number of accidents per year, and the number of accidents that were the fault of the truck driver in the opinion of the reporting officer. As shown in the table, the number of accidents per year involving trucks has not been high, and has been less so if one considers only those for which fault was assigned to the truck driver.

TABLE IV.K-1

COLLISIONS INVOLVING TRUCKS ON LIKELY PROJECT TRUCK ROUTES (2002-2004)

Roadway	Length of Segment	All Accidents		Fault of Truck Driver	
		Total	Per Year	Total	Per Year
University Avenue (Oxford Street to I-80)	2.19 miles	17	5.7	10	3.3
Oxford Street (University Ave. to Hearst Ave.)	0.12 mile	1	0.3	1	0.3
Hearst Avenue (Shattuck Ave. to Highland Pl.)	0.72 mile	1	0.3	1	0.3
Shattuck Avenue (Hearst Ave. to Ashby Ave.)	1.31 mile	5	1.7	2	0.7
Adeline Street (Shattuck Ave. to Ashby Ave.)	0.39 mile	3	1.0	3	1.0
Ashby Avenue (Shattuck Avenue to I-880)	1.66 mile	9	3.0	4	1.3

SOURCE: CHP (2004)

The proposed project would neither change the physical characteristics of the street network serving the site, nor generate traffic that is incompatible with existing traffic patterns. It would be unlikely that the rate of motor vehicle accidents (i.e., accidents per number of vehicles) would increase as a result of the project. There would be no reasonably foreseeable significant risks to health and safety from transporting project demolition material.

Mitigation: None required.

Cumulative Impacts

Impact IV.K-5: The proposed project, in combination with planned, pending, and/or reasonably foreseeable projects in the area of the proposed project could alter traffic patterns in the project area. (Less than Significant)

As described in Chapter VI, CEQA Considerations, planned, pending, and/or reasonably foreseeable projects in the area of the proposed project include rehabilitation of Buildings 77 and 77A, Resource Conservation and Recovery Act (RCRA) Corrective Measures Implementation (CMI), construction of an Animal Care Facility, development in the surrounding area including growth and development within the City of Berkeley as envisioned in the 2001 Berkeley General Plan, implementation of the 2020 LRDP for UC Berkeley, and several other UC Berkeley projects.

The proposed project would generate no new operational (long-term) vehicle trips and would have a less-than-significant effect on long-term traffic conditions. Under cumulative conditions, traffic volumes would increase on area roadways and at study intersections due to the potential development cited above. Recent (2004) estimates of increases in roadway and intersection traffic volumes were presented in the University of California at Berkeley's *2020 Long Range Development Plan & Chang-Lin Tien Center for East Asian Studies Final EIR*. The intersections in the project area cited under "Setting" above would continue to operate at acceptable levels of service (LOS D or better) during the a.m. and p.m. peak hours, except for the University Avenue/San Pablo Avenue, University Avenue/Sixth Street, and Gayley Road/Stadium Rim Way intersections, where delays within LOS F would increase. As described under Impact K.1 above, the project would generate a short-term increase in traffic volumes on area roadways that would fall within the daily fluctuation of traffic, which would not be noticeable to the average motorist. The project-generated trips would add negligible traffic to long-term cumulative conditions. Demolition traffic would be short-term and incremental, and it is not likely that the project's peak daily trip generation (trucks and worker vehicles), during the project's final phase, would cumulatively coincide with the projects identified in this EIR. In any case, implementation of Mitigation Measure K.1.1 would ensure that traffic-generating activities associated with concurrent projects would not have a significant effect on traffic conditions. In addition, as discussed in Section IV.F, the potential impact of exposure to hazardous materials during transportation to off site facilities would be less than significant, and the project would not result

in a significant cumulative impact, because the project would not combine with other projects to create a substantial risk due to transport of hazardous materials.

Please refer to the cumulative impacts discussion in Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts related to transportation and traffic. The project would incorporate Mitigation Measure IV.K-1, which would ensure that traffic impacts would be less than significant.

Building 51 Demolition Project-Specific Mitigation Measures:

Mitigation Measure IV.K-1:

> The frequency of truck trips (loaded or empty) shall be no greater than (a) one every 10 minutes (six truck trips per hour) during the a.m. and p.m. peak commute hours, and (b) one every five minutes (12 truck trips per hour) during periods other than the a.m. and p.m. peak commute hours.

References –Transportation/Traffic

Abrams Associates, *2002 Level of Service Monitoring Prepared for the Alameda County Congestion Management Agency*, November 2002.

American National Standards Institute (ANSI), 13.12, *Surface and Volume Radioactivity Standards for Clearance*, New York, August 1999.

California Highway Patrol (CHP), *Statewide Integrated Traffic Records System* (SWITRS) reports, 2002-2004.

City of Berkeley, *City of Berkeley General Plan: A Guide for Public Decision-Making*, 2001.

Lawrence Berkeley National Laboratory (LBNL), *Health and Safety Manual*, Construction Safety, revised October 2004.

University of California Berkeley (UC Berkeley), *2020 Long Range Development Plan & Chang-Lin Tien Center for East Asian Studies Final EIR*, April 2004.

L. Utilities, Service Systems, and Energy

Introduction

This section discusses existing conditions and demand for water, wastewater, solid waste disposal and recycling, and electricity and natural gas at the project site and vicinity. The potential for the project to create additional demand on these public utilities is also analyzed.

Setting

Water Supply

Water Supply Connections

The East Bay Municipal Utility District (EBMUD) provides the high-pressure water supply for LBNL, including the project site, at two separate connections. The primary connection is to EBMUD's Shasta Pressure Zone, which provides water service to customers within an elevation range of 900 to 1,050 feet and has a two-million-gallon capacity. The second connection is the Berkeley View Pressure Zone, which provides water service to customers within an elevation range of 1,050 to 1,250 feet and has a one-million-gallon capacity. The Lab receives its water through a 12-inch meter on Campus Drive in the Shasta Pressure Zone and a six-inch meter on Summit Road from the Berkeley View Pressure Zone. The EBMUD facilities are part of the EBMUD system and are backed up by additional reservoirs, pumping facilities, aqueducts, and transmission lines. The EBMUD system has been reliable over the years and has been properly maintained, monitored, and operated.

Water Distribution

High-pressure water is distributed throughout LBNL by an extensive piping layout providing domestic and fire protection water to the project site. The Lab's system also supplies water for cooling towers, irrigation water, and water for other miscellaneous uses at LBNL. The system includes fire hydrants, fire department connections, and sprinkler services to almost all LBNL buildings. In many areas of the site, the LBNL water delivery system is looped and equipped with block valves, which can be used to isolate portions of the system for repair or replacement while still maintaining full service to most facilities.

Due to elevation differences at the Lab, there are five main pressure zones operating at the nominal operating pressure of 70 pounds per square inch (psi). The water distribution system is entirely a gravity system, except for the emergency fire protection system. Most of the existing pipe in the system is either cement-lined and coated steel pipe with welded joints or ductile iron pressure pipe with mechanical joints. The pipe has been designed and installed to resist earth movement caused by landslides and/or earthquakes, and it has been located to avoid potentially unstable earth areas wherever practicable.

The Lab conducts periodic inspections of its water distribution system and has installed back-flow prevention devices in accordance with the Uniform Plumbing Code to ensure the integrity of the domestic water supply system. Periodic pressure tests are performed to ensure that the system operates at appropriate pressure levels.

Emergency Water Supply

LBNL operates and maintains three 200,000-gallon water storage tanks for emergency water supply in the event of service interruption from EBMUD. One tank is located near Building 82 in the Central Research Area, the second tank is located near Building 68 in the Grizzly Operations Support Area, and the third tank is located near Building 13J in the East Canyon Area. The tanks at Buildings 82 and 68 are each equipped with a diesel-powered pump and automatic controls to pressurize LBNL's water distribution system if EBMUD service is interrupted. In normal operation, water is slowly circulated from the LBNL system through the 200,000-gallon tanks so they are always filled with potable water, and the full 600,000 gallons are always available if needed.

In the event that one or both of the water supply pipelines from EBMUD to Berkeley Lab are damaged, the storage tanks and fire pumps at LBNL would maintain water supply and water pressure to every building and fire hydrant on the Berkeley Lab site. (There are 64 fire hydrants located for optimum service distribution throughout the Laboratory. Each hydrant has one four-inch and two 2.5-inch valved connections.) Each pump starts automatically when it senses a drop in water pressure in the distribution system. The starting of the pump is announced via the site-wide fire alarm system at the fire dispatch center. The pump can also be manually started or stopped from the fire dispatch console or at the control panel at each of the pump houses.

Existing Water Demand

In fiscal year (FY) 2004, LBNL purchased 37.5 million gallons of water for the main Hill site. Of the total water demand, personal water use, or water used directly by the Lab population for consumption and sanitary purposes, accounted for about 30 percent of the total demand, or about 11.25 million gallons. Process water, used for research, cooling, heating, industrial, cleaning, construction, and landscaping purposes, accounted for the balance of total water use. Estimated water demand at Building 51 from its approximately 50 current occupants is about 184,000 gallons annually, or approximately 770 gallons per working day.[1]

Over time, the demand for water at LBNL has been decreasing due to improved efficiency in water use. Between FY 1990 and FY 2004, total annual water use, including both personal water and process water, decreased from approximately 78.6 million gallons to 37.5 million gallons, a decrease of over 50 percent.

[1] At the time of writing, there were 53 Building 51 occupants who each were assumed to use approximately 14.5 gallons per working day of water.

Wastewater

Wastewater Transmission

Wastewater from LBNL is carried via a gravity flow system through either of two monitoring stations, one located at Hearst Avenue and the other at Centennial Drive in Strawberry Canyon. The project site is currently served by the Hearst Avenue Station. The volume of the effluent is measured on a continuous basis, and samples are taken at regular intervals and evaluated for radioactivity as well as for other constituents mandated by EBMUD. The LBNL sewer serving the project site connects to the City of Berkeley's public sewer system at Basin 17-013, just above the intersection of Highland Place and Cyclotron Road. Effluent then flows to an EBMUD-operated intercepting sewer, which transports it to a regional wastewater treatment plant located southwest of the interchange of I-80 and I-580 in Oakland. The facility is owned by EBMUD and serves a variety of East Bay cities and the Stege Sanitary District. The wastewater treatment facility has a total plant capacity of 168 million gallons per day (mgd), and an average dry weather flow of 77 mgd (EBMUD, 2001). The plant's peak wet weather capacity is approximately 415 mgd. EBMUD estimates this flow will remain the same through 2020 (EBMUD, 2001). After treatment, wastewater is discharged off the East Bay shore into the San Francisco Bay via a one-mile long deep-water outfall line.

The main concern with sewer flow region-wide in the EBMUD system is the infiltration and inflow (known as "infiltration / inflow" or "I/I") of stormwater into the sanitary sewer system attributed to the poor condition of aging sewer pipes. LBNL has acted to address infiltration/inflow problems in its own system and has made substantial improvements in recent years. In addition, LBNL has undertaken a plumbing maintenance and upgrade effort during the past 15 years, along with installation of water-saving devices and systems, to substantially lower average sewer flows. The savings realized by these ongoing efforts has reduced both peak wet weather as well as average sewer flows by well over half since 1990.[2] Moreover, LBNL's peak wet weather infiltration/inflow rate is only approximately ten percent of that found in EBMUD's district on average.

Through a concerted sewer infrastructure upgrade program, LBNL has far exceeded EBMUD's regional goals for infiltration/inflow sewer performance. In addition, the University has contributed to the City of Berkeley's sewer upgrade program. This program is intended to increase wet weather flow capacity and reduce infiltration/inflow problems.

The City of Berkeley's infiltration/inflow correction program was initiated in 1987 and includes rehabilitation or replacement of 50 percent of the City's existing system over 30 years, as well as installation of 12 miles of new sewer lines to accommodate overflow conditions by the year 2007. By 1999, over 25 percent of the planned replacement and rehabilitation had been completed and 10 miles of the proposed 12 miles of new sewer lines had been installed. A 22-mile interceptor line along Adeline Street, completed in 1992, now conveys wet weather flow to EBMUD's

[2] The ratio of water consumption to wastewater generation for developed areas is typically assumed to be 1:1. According to existing data at LBNL, wastewater generation is about 95 percent of water consumption. Thus the reduction in average sewer flows at LBNL has been comparable to reductions in water consumption, both about 50 percent between 1990 and 2004.

storage and treatment facilities. The City's infiltration/inflow correction program allows for a 20 percent increase in the base wastewater flow due to changes in land use or population (City of Berkeley, 2001).

As a part of the Resource Conservation and Recovery Act (RCRA) Corrective Action Plan process and remediation described in Section IV.F, Hazards and Hazardous Materials, LBNL currently treats groundwater at the project site from two subdrains in the Building 51 complex. One subdrain extends along the south section of Building 51 and enters into a storm drain catch basin inside Building 51A. The effluent from this subdrain is currently collected and treated outside of Building 51 to non-detectable levels of contaminants and then it is either injected into a well inside Building 51A and/or discharged to the sanitary sewer under permit with EBMUD. The other subdrain is located in the basement of the former Motor Generator Room within Building 51. A treatment system located in the basement treats water that is then discharged to the sanitary sewer under permit with EBMUD. This treatment system will be relocated prior to demolition of the room. Interim provisions for treatment will be made during the transfer to minimize down time.

Existing Wastewater Generation

Annual wastewater generation at LBNL is approximately the same as water consumption, which, as stated above, was 37.5 million gallons in FY 2004. While sewer flows vary widely according to the time of day and time of year, the Lab's approximate average daily flow is about 75,000 gallons per day (gpd) during dry weather conditions and 150,000 gpd during wet weather conditions. Estimated wastewater generation at Building 51 from its approximately 50 current occupants is approximately 174,500 gallons annually, or approximately 730 gallons per working day.[3] LBNL continues to seek ways in which to reduce both water consumption and sewage generation.

Storm Drainage

Because of LBNL's hillside location, a storm drainage system has been installed that discharges into the North Fork of Strawberry Creek to the north and Strawberry Creek to the south. The existing system provides for runoff intensities expected in a 25-year maximum-intensity storm. A detailed discussion of the existing on-site stormwater drainage is included in Section IV.G, Hydrology and Water Quality.

Non-Hazardous Solid Waste

The LBNL Facilities Division collects non-hazardous solid waste from Berkeley Lab buildings. In calendar year (CY) 2004, the Lab generated 191.5 metric tons (about 423,000 pounds) of routine solid sanitary waste, which was disposed by the Richmond Sanitary Service. In addition, it generated 1,087.43 metric tons (about 2,396,000 pounds) of waste that was recycled. As a government-owned facility operated through contract by the University of California, LBNL

[3] The Building 51 occupants were each assumed to generate approximately 13.8 gallons per working day of wastewater.

complies with the waste minimization reporting requirements of DOE, the State of California, the University of California, and Berkeley Lab itself, and has achieved significant reductions in the amount of waste it generates. As of CY 2004, LBNL had reduced the amount of routine solid sanitary waste going to land disposal by almost 80 percent compared with the baseline year set by DOE of CY 1993. The reductions were achieved through waste segregation and recycling efforts and through a composting and mulching program.

Electricity

Electricity Sources and Transmission

Electrical power to LBNL is purchased from the Western Area Power Administration and delivered by Pacific Gas & Electric Company's (PG&E) transmission system to the Lab's Grizzly Peak Substation located adjacent to Building 77. PG&E delivers this power to LBNL on two overhead 120-kilovolt (kv) transmission lines with a joint capacity of approximately 200 Mega-Volt-Amperes (MVA). Both these transmission lines feed power from PG&E's El Sobrante switching station to the Grizzly Peak Substation. The Grizzly Peak Substation consists of two DOE-owned 120/12-kv power transformers with a combined capacity of 100 MVA. This substation is for the exclusive use of LBNL. In addition, LBNL can be supplied from UC Berkeley's Hill Area Substation, located adjacent to the Grizzly Peak Substation.

The main power distribution system at the Lab consists of a 12-kv underground system with smaller substations and transformers which reduce voltage to 480/277 volts or 208/120 volts. The 12-kv distribution system has dual primary feeders to provide reliable power. Certain buildings are equipped with special voltage regulation in order to ensure that critical experiments will not be disrupted by transient voltage within the system.

Existing Electricity Demand

Total electrical power consumption at LBNL in 2004 was 71,400 megawatt hours (MWh). The current estimated electricity use at Building 51 is approximately 246 MWh annually.

Natural Gas

Natural Gas Sources and Transmission

LBNL's natural gas supply is provided by the Defense Fuel Supply Center in Oregon and delivered by the PG&E system. The LBNL natural gas system receives its supply from a six-inch PG&E line operating at 50 psi. The point of delivery is a meter vault in the hillside area above Cyclotron Road and below Building 88. A six-inch gas line operating at 13 psi provides natural gas from PG&E's metering vault to the Building 51 complex. This is reduced to a two-inch line entering the complex from Lawrence Road to the south and a two-inch line entering the complex from the north. The piping for the LBNL site's natural gas system consists of two types: coated and wrapped steel, and polyethylene. The system includes pipes, valves, fittings, pressure-reducing stations, earthquake emergency shut-off valves, meters, and appurtenances.

Existing Natural Gas Demand

In FY 2004, natural gas usage at the Lab was approximately 158 million therms. The current natural gas use at Building 51 is approximately 16,200 therms annually.

Regulatory Environment

1987 LBNL Long Range Development Plan (LRDP)

The 1987 LBNL Long Range Development Plan sets forth the following planning objectives that are relevant to the proposed project:

- Protect the environment, plan for site amenities and constraints, and buffer activities from adjacent populations.

- Promote energy conservation and cost economies through efficient design, location, operation, and maintenance.

City of Berkeley General Plan

As a federal facility conducting work within the University of California's mission, LBNL is generally exempt under the federal and state constitutions from compliance with local requirements. However, LBNL seeks to cooperate with local jurisdictions to reduce the physical consequences of its activities to the extent feasible. The City of Berkeley General Plan is a statement of community priorities developed to guide public decision-making. Relevant City of Berkeley General Plan policies include the following.

Water Supply and Distribution

City of Berkeley General Plan policies and actions pertaining to water supply and distribution include:

- Policy EM-26 Water Conservation: Promote water conservation through City programs and requirements.

  Actions:

  B) Consider participation in the East Bay Municipal Utility District's East Bay-shore Recycled Water Project to make recycled water available for irrigation and other non-potable uses.

- Policy EM-31 Landscaping: Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.

Wastewater

City of Berkeley General Plan policies that relate to wastewater collection and treatment include:

- Policy EM-24 Sewers and Storm Sewers: Protect and improve water quality by improving the citywide sewer system.

Stormwater Drainage

City of Berkeley General Plan policies and actions related to stormwater management include:

- Policy EM-23 Water Quality in Creeks and San Francisco Bay: Take action to improve water quality in creeks and San Francisco Bay.

  Actions:

  D) Restore a healthy freshwater supply to creeks and the Bay by eliminating conditions that pollute rainwater, and by reducing impervious surfaces and encouraging use of swales, cisterns, and other devices that increase infiltration of water and replenishment of underground water supplies that nourish creeks.

Solid Waste

The City of Berkeley General Plan identifies policies regarding solid waste, including:

- Policy EM-7 Reduced Wastes: Continue to reduce solid and hazardous wastes.

- Policy EM-8 Building Reuse and Construction Waste: Encourage rehabilitation and reuse of buildings whenever appropriate and feasible in order to reduce waste, conserve resources and energy, and reduce construction costs.

- Policy EM-10 Materials Recovery and Remanufacturing: Support and encourage serial materials recovery and remanufacturing industries.

- Policy EM-11 Biodegradable Materials and Green Chemistry: Support efforts to phase out the use of long-lived synthetic compounds, such as pesticides and vehicle anti-freeze, and certain naturally occurring substances which do not biodegrade. Encourage efforts to change manufacturing processes to use biodegradable materials, recycle manufactured products, reuse byproducts, and use "green" products.

Energy

City of Berkeley General Plan policies relating to energy conservation include:

- Policy EM-35 Energy-Efficient Design: Promote high-efficiency design and technologies that provide cost-effective methods to conserve energy and use renewable energy sources.

- Policy EM-36 Energy Conservation: Continue to implement energy conservation requirements for residential and commercial buildings at the time of sale and at time of major improvements.

- Policy EM-39 Business Energy Conservation: Encourage all businesses to implement energy conservation plans.

- Policy EM-40 Market Support: Support the market for energy-efficient technologies and services. (City of Berkeley, 2001)

Impacts and Mitigation Measures

Significance Criteria

As more fully described in the 1987 LRDP EIR, as amended, potential impacts on water supply systems, wastewater disposal systems, storm drainage systems, solid waste disposal systems, and energy systems could result from continued University operation of LBNL, including continued facility development as contemplated in the 1987 LRDP. (See Section IV.G, Hydrology and Water Quality, for an expanded discussion of the existing and proposed on-site stormwater drainage system.)

The impact of an LBNL project on utilities, service systems, and energy would be considered significant if it would exceed the following standards of significance, in accordance with Appendices F and G of the state CEQA Guidelines and the UC CEQA Handbook:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant adverse effects;
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Have insufficient water supplies available to serve the project from existing entitlements and resources, or if new or expanded entitlements are needed;
- Result in a determination by the wastewater treatment provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs;
- Exceed the capacity of an energy supplier to provide the project's energy needs;

  Not comply with applicable federal, state, and local statutes and regulations related to solid waste;
- Result in wasteful, inefficient, and unnecessary consumption of energy during project demolition that cannot be feasibly mitigated; or
- Exceed an applicable LRDP or Program EIR standard of significance.

The project is located adjacent to an urban area and all basic utilities that would be required to complete the demolition activities are located at the project site. It is anticipated that additional needs created by the project would not necessitate construction of new or expanded systems. See Section IV.G, Hydrology and Water Quality for more detailed information regarding stormwater drainage.

Measures Included as Part of the Project

The following relevant impacts to utilities, service systems, and energy have been anticipated and analyzed pursuant to CEQA as part of the programmatic 1987 LRDP EIR, as amended, from which this analysis is tiered:

Impact III-M-1:	Projected development according to the 1987 LRDP may create demands with regard to existing waste water and sanitary sewer systems.
Impact III-M-2:	Development proposed under the 1987 LBNL LRDP would increase the demand for domestic water. This demand is well within the capacity of the existing ties to EBMUD and the LBNL water distribution system. This demand is not considered significant.
Impact III-M-3:	Development proposed under the 1987 LBNL LRDP would increase the usage of natural gas. The projected usage is within the capacity of the existing PG&E and LBNL systems, except for the main extensions required for new buildings. This increased usage is not considered significant.
Impact III-M-5:	Development proposed under the 1987 LBNL LRDP would increase the usage of electrical power. PG&E has the capacity to supply this power. This increased usage is not considered significant.
Impact III-N-1	Increased energy demand from new facilities will occur in conjunction with continued implementation of the 1987 LRDP.

Additional mitigation measures related to hazardous waste are discussed in Section IV.F, Hazards and Hazardous Materials.

As a result of anticipated impacts on utilities and service systems, the following mitigation measures adopted as part of the 1987 LRDP EIR, as amended, are already required for the proposed project and are therefore incorporated as part of the proposed project's description:

Mitigation Measure III-M-1:	Prior to construction of any project which may add significant sewer load to the city sanitary sewer system, LBNL will investigate the potential impact of the project on the city system. LBNL will identify mitigation measures to accommodate the sewer load if the impact investigation indicates that the city system could not accommodate the additional sewage. LBNL will reimburse the City of Berkeley and/or EBMUD for its fair share of allowable and necessary sewer improvement capital costs which are needed to accommodate increased demand and mitigate

sewer impacts resulting from implementation of the LBNL LRDP.

Impacts

Impact IV.L-1: The project would generate demolition waste and debris, which could reduce the available capacity of landfills. (Less than Significant)

Project demolition activities would generate waste and debris. Some items would be contaminated with radioactivity or have other hazardous characteristics. These waste types and their disposition options are discussed in Section IV.F, Hazards and Hazardous Materials. About half of the materials that would be removed would consist of non-hazardous construction debris and other solid waste. Categories of the latter include reinforced concrete shielding blocks, concrete from the building slab and foundation, glass, wood and metals. In the Bevatron accelerator itself, the most prevalent material is steel, with significant amounts of copper, aluminum, and other metals also present. In addition, there would be incidental quantities of other materials in the Bevatron apparatus, such as rubber, epoxy, and plastic.

The proposed project would use contractors to remove the various types of construction debris that would be generated. The project would seek to reuse or recycle non-hazardous waste where feasible. For example, uncontaminated metals might go to scrap dealers. Items that could not be salvaged would be sent to appropriate municipal landfills, such as the Altamont Landfill in Livermore, California.

As stated in Section IV.F, metals not subject to the DOE Metals Release Suspension would be eligible for unrestricted ("free") release. For concrete shielding blocks, reuse options include shielding at other accelerators, and soil stabilization. Prior to release for shipment off-site, these materials would be screened in accordance with the LBNL EH&S Protocol for Survey and Release of Bevatron Materials (LBNL, 2005). Such materials can be sent off-site and reused or recycled by government agencies and private sector parties without restrictions. If reuse or recycling is not feasible, non-radioactive concrete blocks, concrete from the other sources, and other non-hazardous materials can be sent to landfills that accept these types of materials.

Another recycling option for concrete with no hazardous characteristics is to send it to commercially operated off-site locations that break concrete into rubble. Rubbling offers transportation advantages, as rubbled material fills the volume capacity of trucks more efficiently than unbroken concrete, thereby decreasing the number of truck trips generated in hauling concrete to subsequent destinations. The resulting rubble could be released for such uses as fill for construction projects and road building, or it could be sent to landfills.

It is assumed that approximately half of the clean fill needed for backfilling the foundation void would be purchased and brought on-site, and the other half would be supplied by clean fill from LBNL, possibly including a small amount of recovered rubble from the slab and foundations.

Table IV.L-1 provides a summary of the principal categories, amounts, and destinations of hazardous and non-hazardous waste that would be generated.

TABLE IV.L-1

DEMOLITION WASTE: ESTIMATED AMOUNTS AND DESTINATIONS

Material	Local Class 3[a] Landfill	Local Class 2[b] or Class 3 Hazardous Waste Facility	Reuse/ Recycle	Low Level Radioactive Waste Disposal Site[e]
Asbestos Containing Material		26 truckloads		
Concrete Shielding Blocks				
Volume contamination				3,200 tons
Eligible for unrestricted release	10,300[c] tons			
Miscellaneous Radioactive Waste Items				250 tons
Bevatron Accelerator				12,360 tons[d]
Building Steel from Accelerator Zone	180 tons[d]			
Building Steel from Outside Accelerator Zone			900 tons	
California Hazardous Materials		40 tons		
Slab and Foundation Debris				
Hazardous materials-contaminated		800 cubic yards		200 cubic yards
Volume contamination				
Non-radioactive			10,500 cubic yards	
Contaminated Soil		200 cubic yards		
Beam Line Components with Internal Surface Contamination				80 tons
Lead				5 tons
Depleted Uranium Shielding				43 tons
Other Non-Hazardous Demolition Waste	750 tons[c]			
TOTALS	**11,230 tons**	**40 tons, 1,000 cubic yards, and 26 truckloads**	**900 tons and 10,500 cubic yards**	**15,938 tons and 200 cubic yards**

[a] A Class 3 Landfill is for disposal of ordinary municipal solid waste.

[b] A Class 2 Landfill is for "designated waste." Designated waste is defined by California Water Code Section 13173 as (a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code and (b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan. Designated wastes typically include such materials as non-friable asbestos, sewage sludge (biosolids), bag house waste, grit, street sweepings, petroleum contaminated soil, triple-rinsed pesticide containers, etc.

[c] Some of this waste may be reused or recycled, lowering the amount that would be sent to landfills.

[d] Subject to DOE Metals Suspension. If not radioactive, some of this waste may be sent to landfills subject to an agreement not to recycle (i.e., "free release").

[e] Envirocare, Nevada Test Site, or other authorized facility; see Section IV.F, Hazards and Hazardous Materials.

As part of its standard operating procedures, LBNL consults with landfills prior to the start of demolition activities to ensure that there is sufficient capacity to accept the amount of waste generated by such projects, and has done so for the proposed project. No problems are anticipated in disposing of the various types of waste that would be generated. Thus, this project would not require construction of new landfills that could have environmental impacts, and this would be a less than significant impact.

Mitigation: None required.

Impact IV.L-2: The project would use existing water services. (Less than Significant)

Increased water demand is usually associated with increases in population or employment, which may also lead to a need for new facilities. However, the proposed project would not introduce any additional long-term population or employment into the area. Water would be required for such purposes as dust suppression and site housekeeping activities; however, the amounts of water required would not be significant and thus would not require additional water facilities or entitlements to serve the proposed demolition activities. All water that is generated during demolition activities would be captured on-site prior to discharge. To minimize the need to store large quantities of water, water use would be limited to the maximum extent feasible. See Section IV.G, Hydrology and Water Quality, for more information regarding water use during demolition activities.

The grasses that would be hydroseeded after building demolition would require relatively little water, and the long-term goal would be to wean the plant materials off the irrigation system and allow them to naturalize. In addition, as part of the final design process, irrigation would be designed so as to minimize overspray and runoff. Irrigation and landscaping are expected to be consistent with the State Water Efficient Landscape Ordinance AB 325. Any increases in demand for irrigation water caused by the proposed project would be minimal and would therefore not adversely affect EBMUD's ability to provide water services or require the construction of new water service lines that could have environmental impacts. Therefore, the proposed project would not cause a significant impact related to water use.

Mitigation: None required.

Impact IV.L-3: The project could generate wastewater. (Less than Significant)

Typically, increased wastewater generation is directly related to increased water use. These increases are usually associated with increases in population or employment (which may also lead to a need for new facilities) as well as increased landscaping area. However, the proposed project would not introduce any additional long-term population or employment into the area. Because

the water that would be used for landscaping purposes after Building 51 has been demolished would generally not be discharged to the sewer system, no increase in wastewater generation caused by the proposed project is anticipated.

Removal of the Building 51 foundation would leave approximately 2.25 acres of pervious surface in its place. This would allow some increase in the amount of stormwater that enters the ground in the vicinity of the project. There are approximately 250 linear feet of four-inch cast iron sanitary sewer line within the footprint of Building 51. This line would either be removed as part of the demolition or abandoned in place. In either case, the pipe would be plugged and capped at the downstream limits of the demolition. This would eliminate the potential for any infiltration (or increased infiltration) of the sanitary sewer system on the project site due to the increased pervious area from the project. Furthermore, immediately downstream of the project, the sanitary sewer system has been upgraded to safeguard against stormwater infiltration and inflow; sanitary sewer pipes are HDPE-lined (high-density polyethylene liners that are seamless and therefore do not provide opportunity for water infiltration), and the closest downstream sanitary manhole has been specially coated inside to seal against potential infiltration.

All water used during the demolition would be captured and analyzed on-site prior to discharge. (See Section IV.G, Hydrology and Water Quality.) LBNL requires its contractors to collect and properly dispose of wastewater that results from washing or hydroblasting of equipment, vehicles, or buildings. In addition, implementation of 1987 LRDP EIR, as amended, Mitigation Measure III-M-1 would help to ensure that peak wet weather wastewater flows from the proposed project would not exceed available wastewater capacity within its subbasin. Overall, it is not anticipated that the proposed project would result in an increase in wastewater discharged to the sanitary sewer, and thus the project's wastewater would remain within the capacity of the existing sewer lines. No new wastewater facilities would need to be constructed to handle wastewater discharges from the project, and thus the impact would be less than significant.

Mitigation: None required.

Impact IV.L-4: The project would consume energy resources. (Less than Significant)

The proposed demolition would require the use of power equipment that would rely on either diesel fuel or electricity for power. All normal operating electrical power would be supplied by PG&E through LBNL's existing infrastructure and the Grizzly Peak Substation. In addition, LBNL can be supplied from UC Berkeley's Hillside Substation. Under the proposed project, demolition materials would be shipped to a local landfill and to locations as far away as Utah (Envirocare facility), thereby creating the need for fuel consumption.

PG&E has the capacity to supply power to the proposed project and the temporary increased usage (from demolition activities) is not considered significant. For reasons stated in Chapter III, Project Description, LBNL and DOE have determined that the proposed project is necessary. The

energy consumption that it would require for its completion would not be wasteful, inefficient, or unnecessary. Further, no new electricity-generating equipment would be required. Thus, no significant environmental impacts would result.

Mitigation: None required.

Cumulative Impacts

Impact IV.L-5: The project, in concert with other development at LBNL and in the surrounding area, would not cumulatively contribute to a significant cumulative utilities impact. (Less than Significant)

In the long term, the proposed demolition project would result in reduced utility usage at LBNL, since Building 51 would no longer exist and would not continue to generate demand for utilities, and no new permanent employees would be added to LBNL as a result of the proposed project. Any project-specific demand for utilities from demolition activities would be within the anticipated demand expected and analyzed under the 1987 LRDP EIR, as amended. Although development at LBNL and in the surrounding area would be expected to increase demand for regional utilities and energy provision, the project's contribution to that combined demand would not contribute significantly to any substantial increase in demand on regional providers. Moreover, regional utilities are managed to accommodate region-wide growth and demand increase; these projects would be expected to fit within this long-term planning. In addition, LBNL, UC Berkeley, and the City of Berkeley all encourage or mandate water and energy-saving devices and practices.

Please refer to the cumulative impacts discussion in Section IV.A, Aesthetics, for a discussion of the reasons why the cumulative effects of a potential future project of unknown purpose and size at the Building 51 site are expected to be less than significant.

Mitigation: None additional required.

Summary of Impacts and Mitigation Measures

The proposed project would not exceed applicable standards of significance and would result in no significant impacts related to utilities. The project would incorporate Mitigation Measure III-M-1 from the 1987 LRDP EIR, as amended.

Building 51 Demolition Project-Specific Mitigation Measures: None required.

References –Utilities, Service Systems, and Energy

City of Berkeley, *Berkeley Draft General Plan Environmental Impact Report*, 2001.

East Bay Municipal Utility District (EBMUD), *Urban Water Management Plan 2000*, February 2001.

Lawrence Berkeley National Laboratory (LBNL), *Protocol for Survey and Release of Bevatron & Building 51 Materials*, June 2005.